Index for March 18, 2008 Revision

MBTA – RAILROAD OPERATIONS
INDEX – STANDARD PLANS

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DRAWING NO.	TITLE	ISSUE NO.	ISSUE DATE
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3314	Clearance Warning Sign	1	10-28-92
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3408	Track Area Lighting Under Platforms for Enclosed Stations	1	03-18-08
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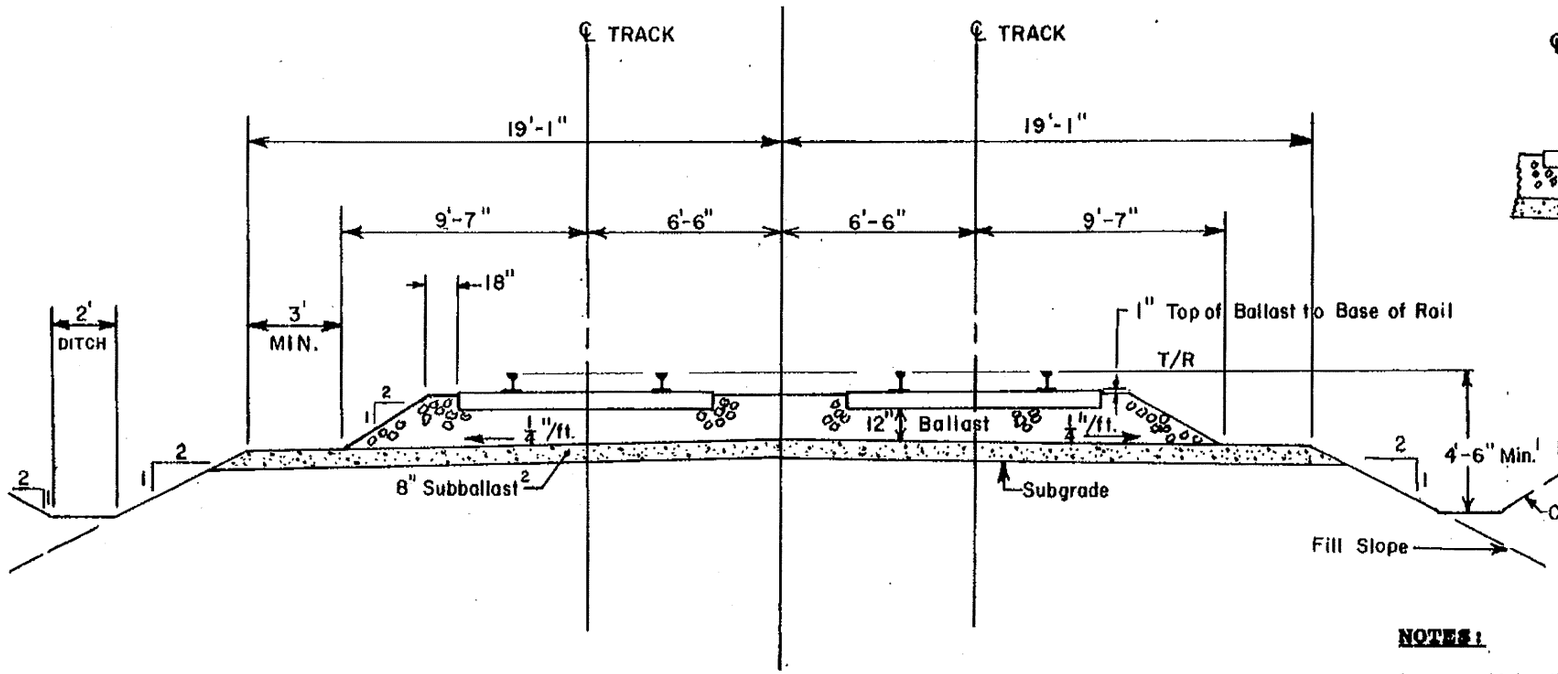
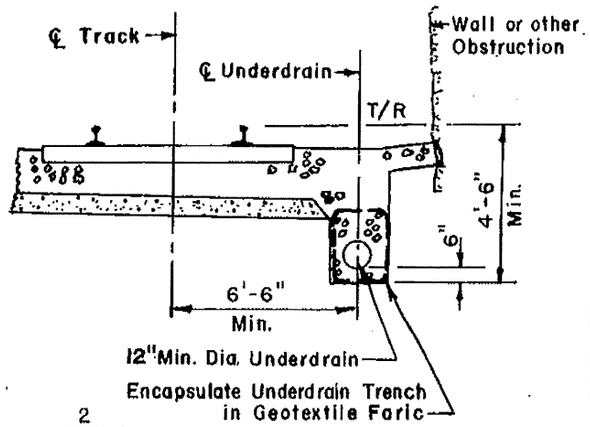


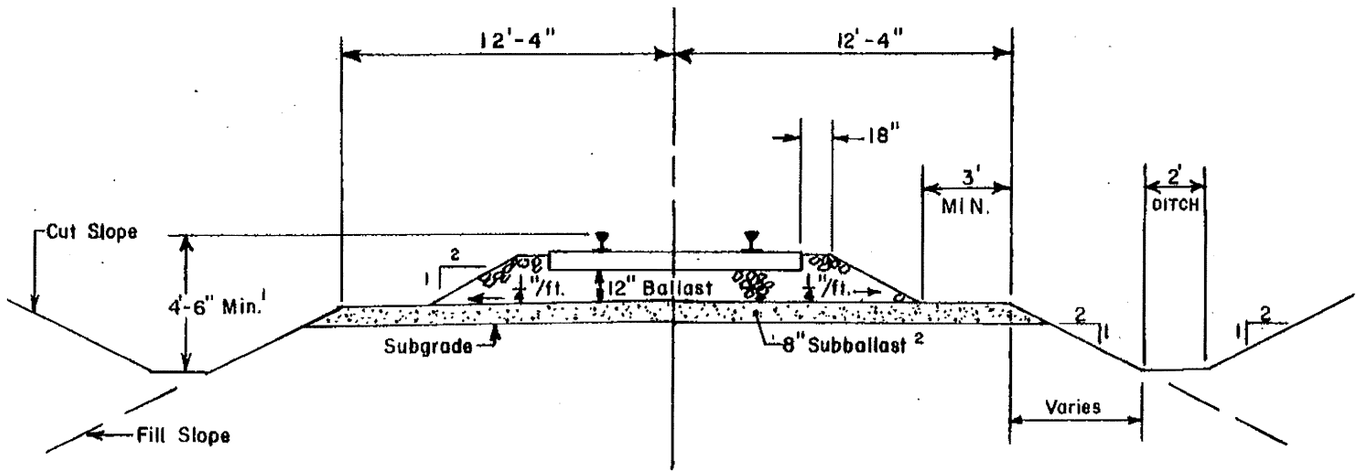
STANDARD SECTION FOR DOUBLE TRACK ON TANGENT



SECTION WHEN SIDE DITCH IS NOT POSSIBLE

NOTES:

1. At locations where sufficient side ditch is not possible, use perforated pipe underdrain (12" min. dia.).
2. In new construction, when subgrade conditions warrant the use of geotextile fabric, place fabric beneath the subballast.



STANDARD SECTION FOR SINGLE TRACK ON TANGENT

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 1000

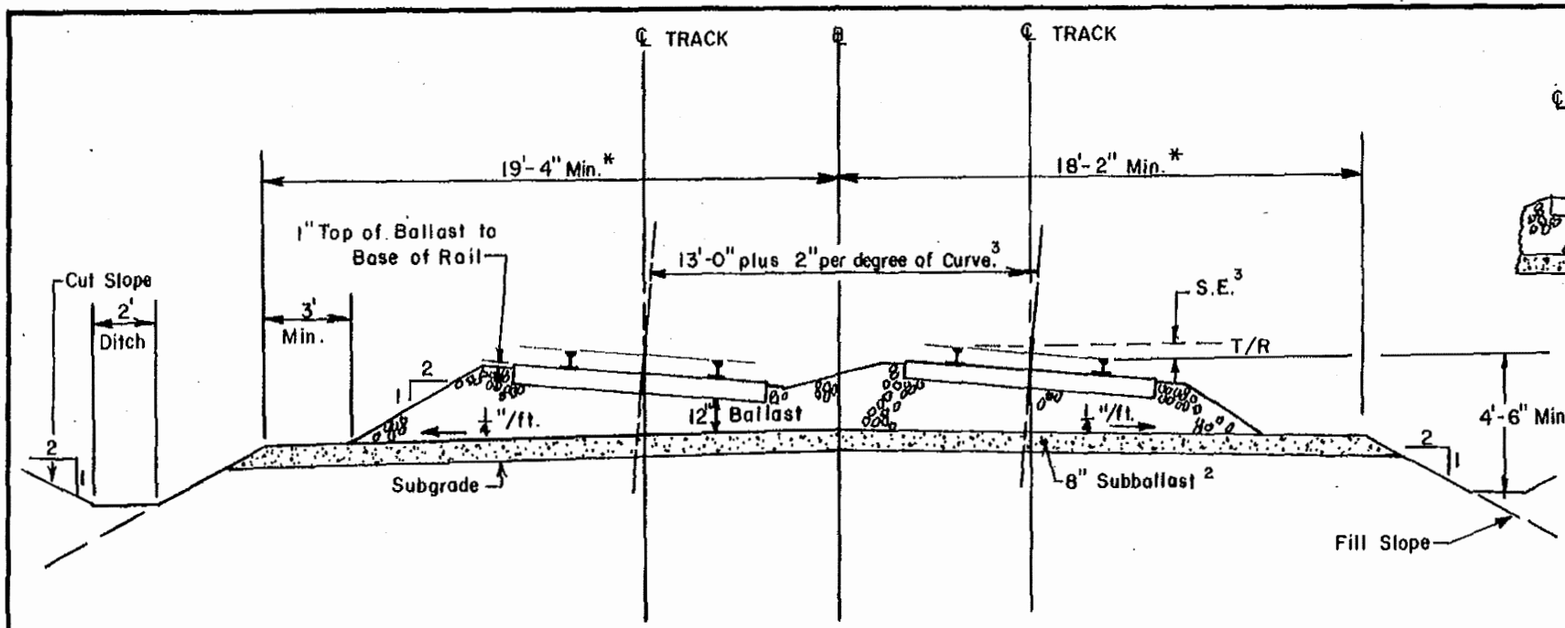
Oct. 28, 1992 (2)

ISSUE DATE ISSUE NO

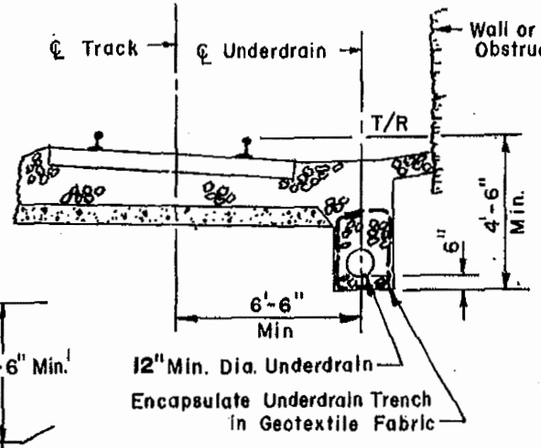
TYPICAL ROADBED SECTION DOUBLE & SINGLE TRACK ON TANGENT

John D. Kemp
ENGINEERING OFFICER

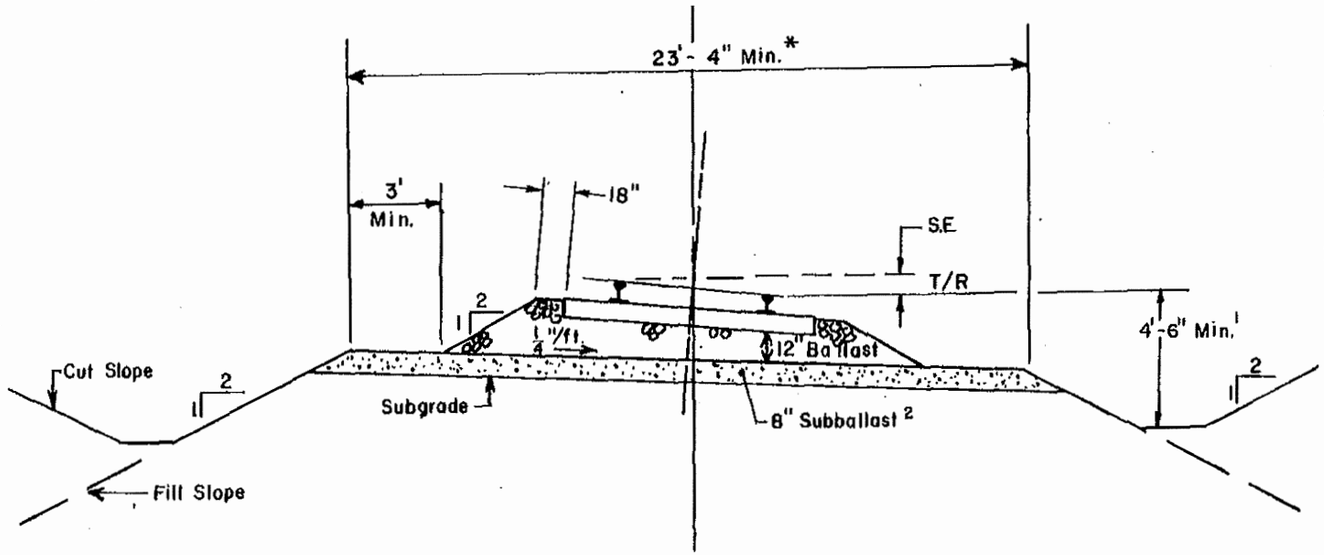
CHIEF ENGINEERING OFFICER



STANDARD SECTION FOR DOUBLE TRACK ON CURVE



SECTION WHEN SIDE DITCH IS NOT POSSIBLE



STANDARD SECTION FOR SINGLE TRACK ON CURVE

*Increase these dimensions as necessary to maintain minimum distance of 3' between bottom of ballast shoulder and top of 2:1 Slope.

1. At locations where sufficient side ditch is not possible, use perforated pipe underdrain (12"min. dia.).
2. In new construction, when subgrade conditions warrant the use of geotextile fabric, place fabric beneath the subballast.
3. Wherever the outside track has the greater superelevation, increase the track centers 3 1/2" per 1" of superelevation difference.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 1002

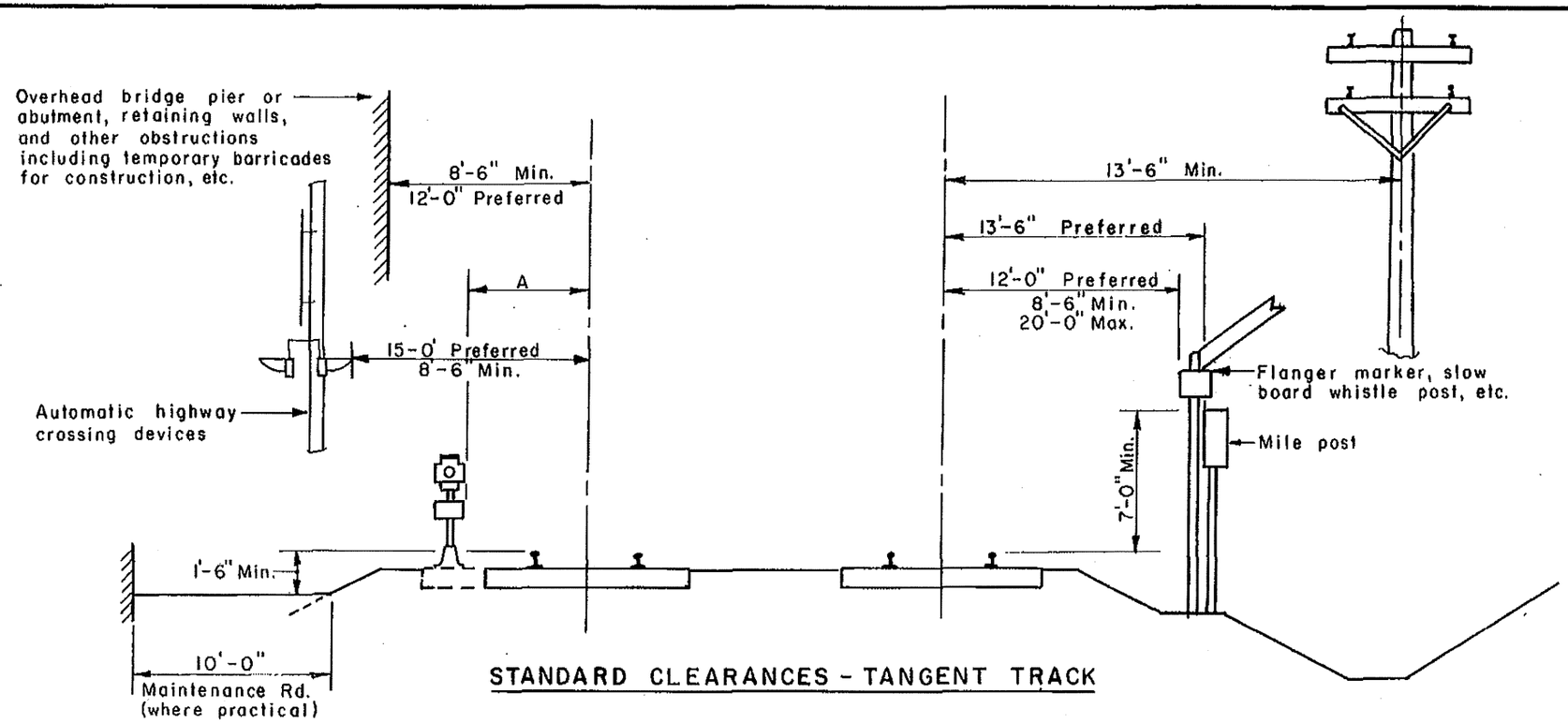
Oct. 28, 1992 ISSUE DATE

2 ISSUE NO

TYPICAL ROADBED SECTION DOUBLE & SINGLE TRACK ON CURVE

ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



STANDARD CLEARANCES - TANGENT TRACK

A-Low switch stand or Electric lock (less than 3'-0" high) - - - - - - - 6'-6"
High switch stand (more than 3'-0" high) - - - - - - - - - - - - - - - - - - 9'-0"

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 1012

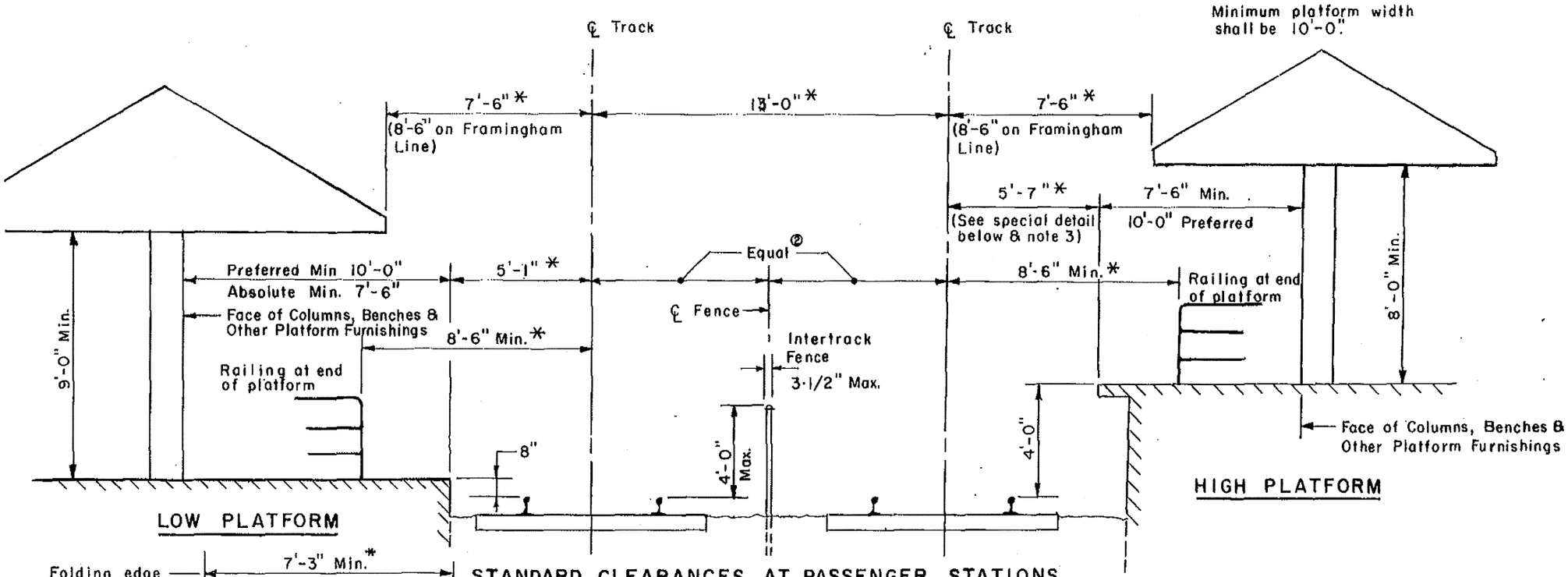
Oct. 28, 1992 ISSUE DATE

(2) ISSUE NO

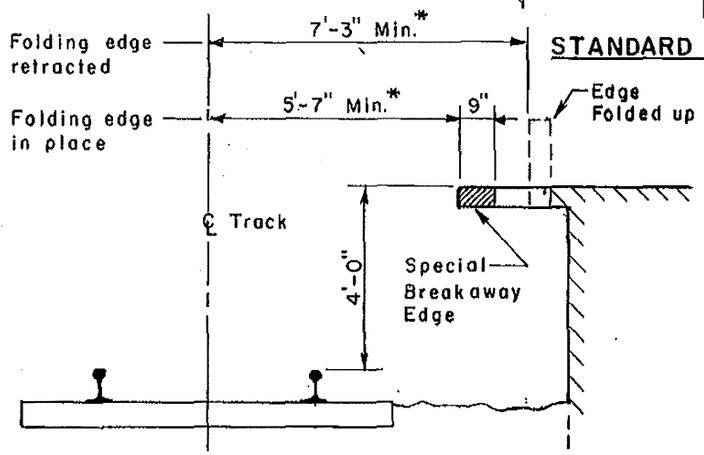
STANDARD CLEARANCES
GENERAL ROADWAY OBSTRUCTIONS
TANGENT TRACK

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



STANDARD CLEARANCES AT PASSENGER STATIONS



SPECIAL HIGH PLATFORM CLEARANCE

Where required by freight operator

NOTES:

1. * Indicates dimensions to be increased for curvature as indicated on Drawings 1018 & 1019.
2. When track centers are less than 13'-0", minimum distance from ℄ of track to face of fence shall be 6'-0".
3. At major terminals with direct fixation and no freight operation, use 5'-4" to high platform.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 1013

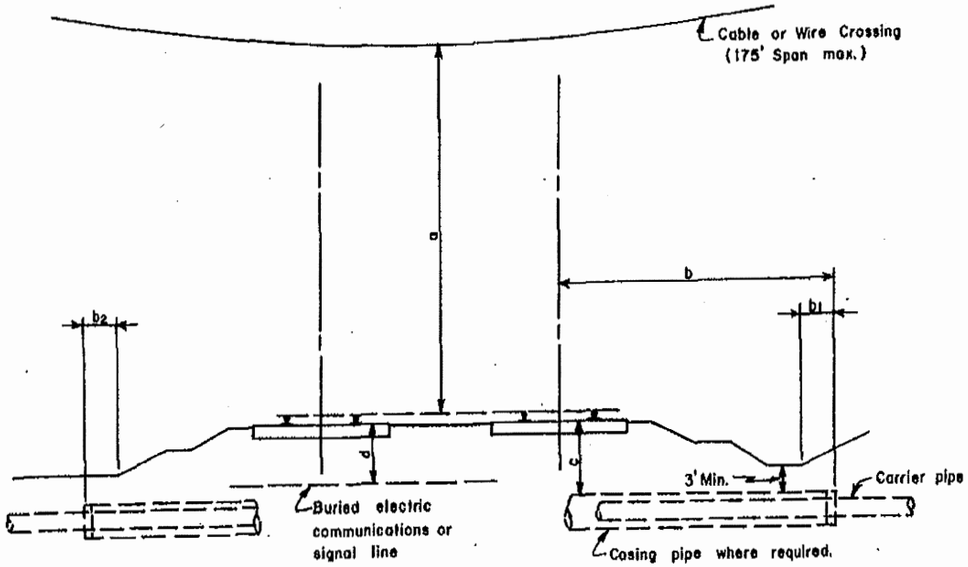
Oct. 28, 1992 (1)

ISSUE DATE ISSUE NO.

STANDARD CLEARANCES AT STATIONS - TANGENT TRACK

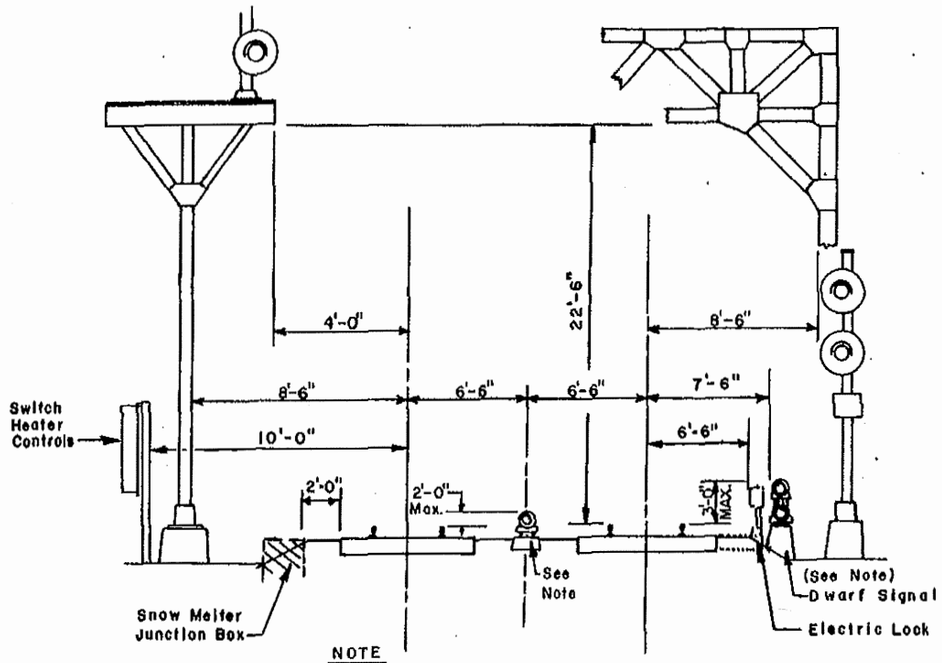
John L. Williams
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



Dimension	Description		
a	Power lines 0 to 750V	27'-0"	At 120°F Ambient Temperature
	Power lines 750 to 15,000V	28'-0"	
	Power lines 15 to 50 KV	30'-0"	
	Other than power lines	27'-0"	
b	Sealed ended casings	25'-0"	
	Open ended casings	45'-0"	
b_1	End casing beyond ditch	2'-0"	
b_2	End casing beyond slope	3'-0"	
c	Casing pipe	4'-6"	
	Carrier pipe without casing	4'-0"	
d	Buried electric lines	4'-0"	
	Railroad signal lines	2'-6"	
	Communications lines	3'-6"	
	Switch Heater Feeds	4'-0"	

MINIMUM CLEARANCES FOR OVERHEAD & BURIED UTILITY CROSSINGS



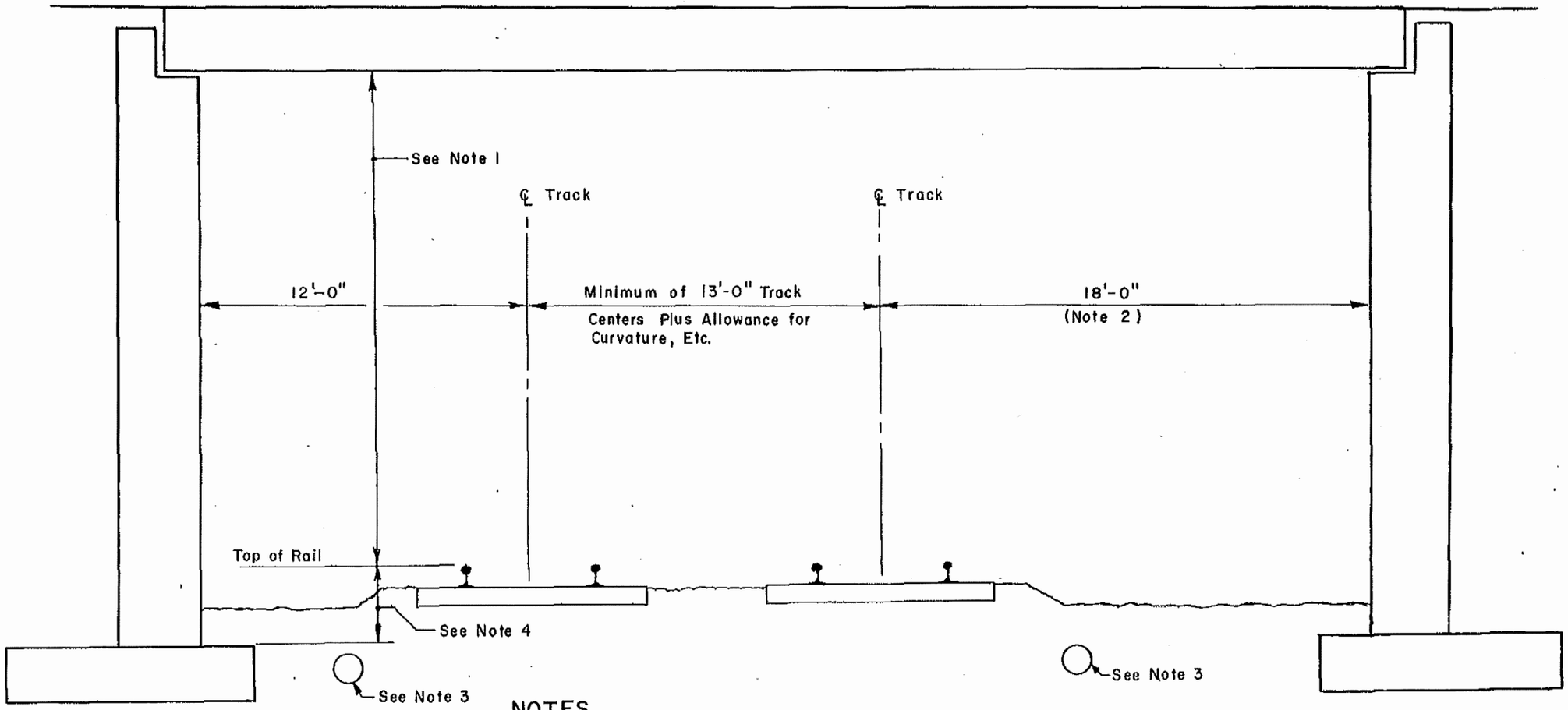
NOTE
Signal Foundations Shall Be Level with Top of Rail Except Dwarf Signals Between Tracks - Foundation to be Level with Top of Ties.

STANDARD CLEARANCE TO SIGNAL EQUIPMENT-TANGENT TRACK

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY | RAILROAD OPERATIONS | DWG. NO. 1014 | Jan. 5, 1996 (3) ISSUE DATE ISSUE NO.

STANDARD CLEARANCES TANGENT TRACK SIGNAL EQUIPMENT & UTILITY CROSSINGS

John D. Parg
SECTION CHIEF



NOTES

1. See Drawing No. 1016 for Vertical Clearances by Route Segment.
2. Provide 18'-0" of Side Clearance on Side Designated for Access / Maintenance Roadway.
3. Provide Storm Drains Sized to have a Flow Capacity Equal To Adjacent R.O.W. Ditches, 12" Dia. Min.
4. Wherever Bridge is Built with Less Than 22'-6" Vertical Clearance, Design Footings to Allow Future Undercutting and Lowering Track To Provide 22'-6".

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 1015

Oct. 28, 1992 (1)
ISSUE DATE ISSUE NO.

CLEARANCES FOR NEW OVERHEAD BRIDGES

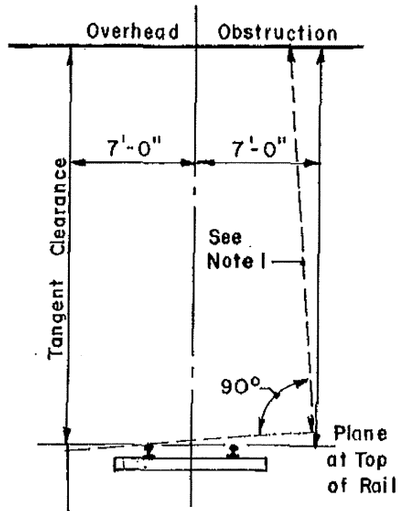
John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER

MIINIMUM ACCEPTABLE VERTICAL CLEARANCES FOR NEW OVERHEAD STRUCTURES

NORTHSIDE		
LINE	SEGMENT/LOCATION	Min. Clear
East Route Main Line	Boston to Everett Junction	20'–8"
East Route Main Line	Everett Junction to Newburyport	18'–0"
Saugus Branch	Everett Junction to Lynn	20'–0"
Gloucester Branch	Beverly Junction to Rockport	18'–0"
Danvers Branch	Salem to Danvers	18'–0"
West Route Main Line	Boston to Wilmington Junction	18'–0"
West Route Main Line	Wilmington Junction to State Line	22'–6"
Newburyport Branch	Wakefield to Topsfield	18'–0"
South Middleton Branch	West Peabody to South Middleton	18'–0"
M & L Branch	Lawrence to State Line	18'–0"
New Hampshire Main Line	Boston to Lowell (Bleachery)	20'–8"
New Hampshire Main Line	Lowell (Bleachery) to State Line	22'–6"
Woburn Branch	Winchester to Woburn	18'–0"
Stoneham Branch	Montvale to Stoneham	18'–0"
Wildcat	Wilmington to Wilmington Junction	20'–8"
Billerica Secondary	North Billerica to Bennett Hall	18'–0"
Fitchburg Main Line	Boston to Willows (Ayer)	20'–8"
Fitchburg Main Line	Willows (Ayer) to Fitchburg	22'–6"
Central Mass. Branch	Clematis Brook to Berlin	18'–0"
Marlboro Secondary	Hudson to Marlboro	18'–0"
Greenville Branch	Ayer to N.H. State Line	18'–0"

SOUTHSIDE		
LINE	SEGMENT/LOCATION	Min. Clear
Framingham (B&A) Main Line	Riverside to Framingham	22'–6"
Shore Line (N. E. Corridor)	Boston to Rhode Island State Line	19'–6"
Needham Branch	Forest Hills to Newton Upper Falls	18'–0"
Dedham Secondary	Readville to Dedham	18'–0"
Stoughton Branch	Canton Jct. to Whittendon Jct.	18'–0"
Millis Secondary	Needham, Junction to Millis	18'–0"
Franklin Branch	Readville to Franklin	19'–6"
East Junction Secondary	Attleboro to Seekonk	18'–0"
Old Colony Main Line	Boston to Braintree	18'–0"
Middleboro Secondary	Braintree to Middleboro	20'–8"
Plymouth Secondary	Braintree to Plymouth	18'–0"
Greenbush Secondary	Braintree to Greenbush	18'–0"



Where there are vertical curves, calculate and compensate for mid ordinate of an 85'-0" long car.

NOTES

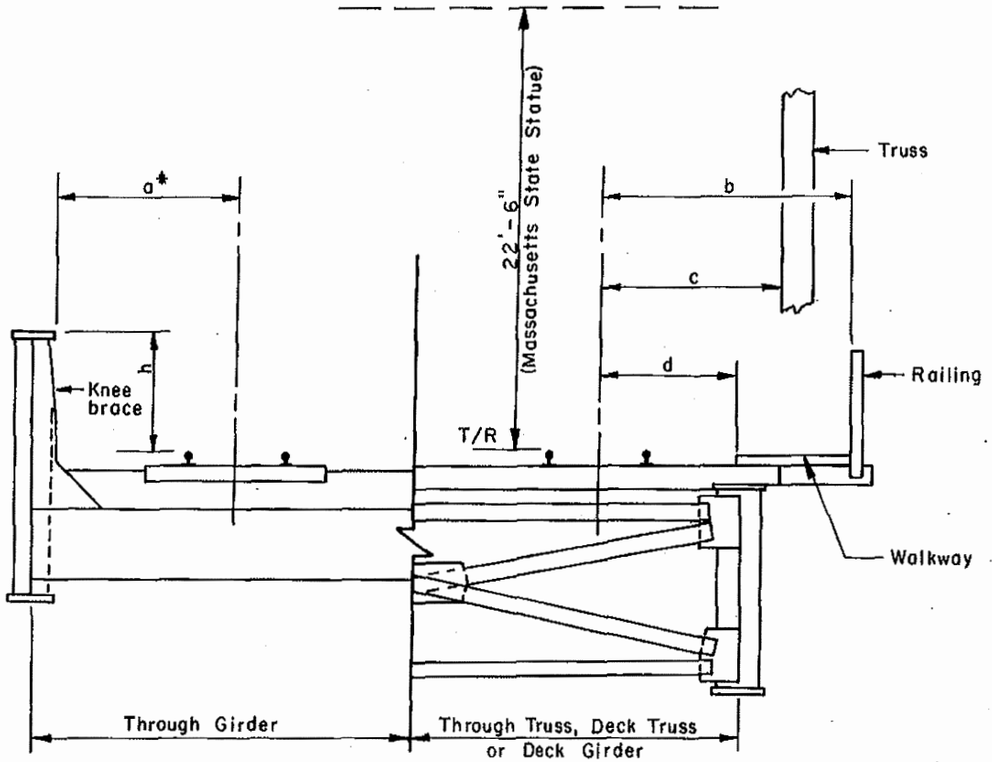
1. Superelevated track is to have clearance measurements taken perpendicular to plane of the superelevation as shown in dashed lines.
2. Vertical clearances shall be measured from the lowest projection (rivet, bolt, pipe, etc.) within 7ft. from centerline of track on each side, as shown.
3. Clearances shown are minimums and require MBTA and Mass. DPU approvals under 22'–6".

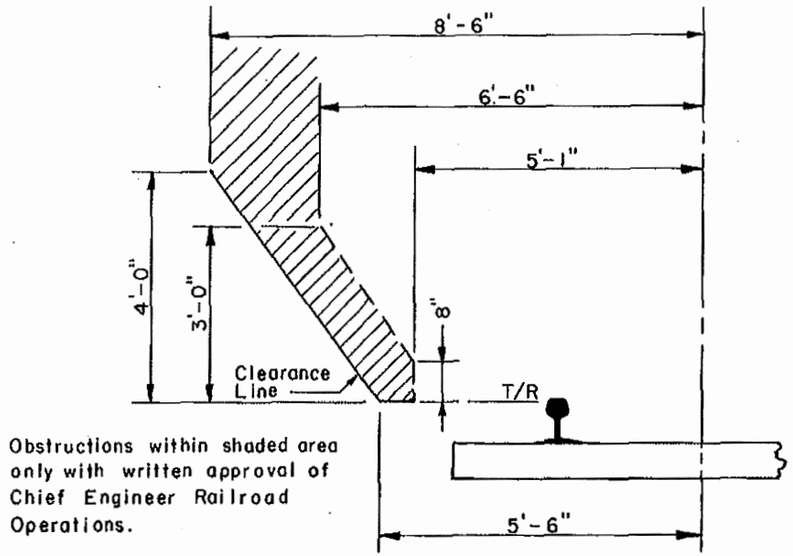
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY | RAILROAD OPERATIONS | DWG. No. 1016 | Oct. 28, 1992 (ISSUE DATE) (1) (ISSUE NO.)

MINIMUM VERTICAL CLEARANCES BY ROUTE SEGMENT

John D. Ray — ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER





Obstructions within shaded area only with written approval of Chief Engineer Railroad Operations.

DETAIL AT THROUGH PLATE GIRDER

DIMENSION	DESCRIPTION	
a	Standard side clearance	8'-6" *
b	Clearance to walkway railing	8'-6"
c	Standard side clearance	8'-6"
d	Standard clearance to walkway edge	4'-6" open deck bridge (use 5'-1" on ballasted deck provided that walkway is not more than 8" above top of near rail)

(For Tangent Track)

For additional clearance for curvture, see Plan 1018.

* If dimension 'h' is 4'-0" or less, then dimension 'a' may be reduced as shown above with the following conditions:
- Bridge is not within yard limits.
- Sign "Will not Clear Man on Side of Car" is posted on both ends of the structure.
- On new bridges, a safety walk outside the girder is provided.

STANDARD TANGENT TRACK BRIDGE SIDE CLEARANCES

(For through girder & truss, deck truss & girder)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

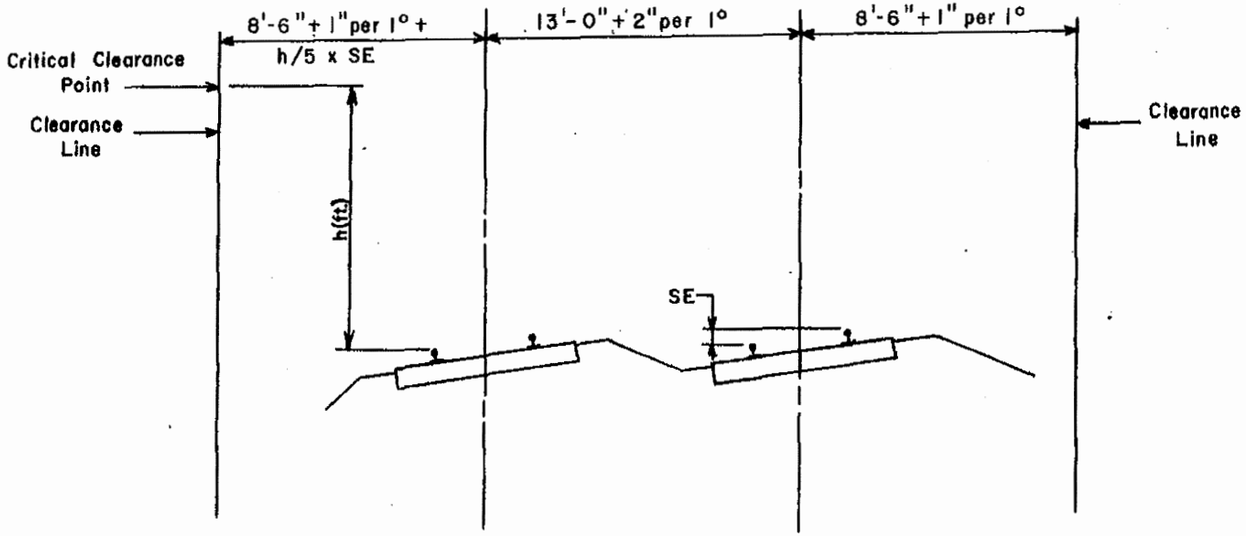
DWG. NO. 1017

Oct. 28, 1992 (ISSUE DATE) (1) (ISSUE NO.)

STANDARD CLEARANCES TANGENT TRACK BRIDGES

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



Standard Side Clearance-Tangent Track ---------- 8'-6"
Track centers between :
Mainline Tracks or Yard Tracks ---------- 13'-0"
Mainline or Passing Track and Ladder Track --- 17'-0"

Increased side clearance for curvature ---------- 1" per 1° *

Increased track centers for curvature ---------- 2" per 1°

Increased side clearance for superelevation ---------- h/5 x SE
Where SE is Superelevation in Inches
h is Height to Obstruction in Feet

* For Clearance Adjustments at Passenger Platforms, see Dwg. No. 1019.

NOTE: Where possible, an 18'-0" side clearance will be provided from the center line of one track for a maintenance roadway.

STANDARD TRACK CENTERS & SIDE CLEARANCE - CURVED TRACK

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

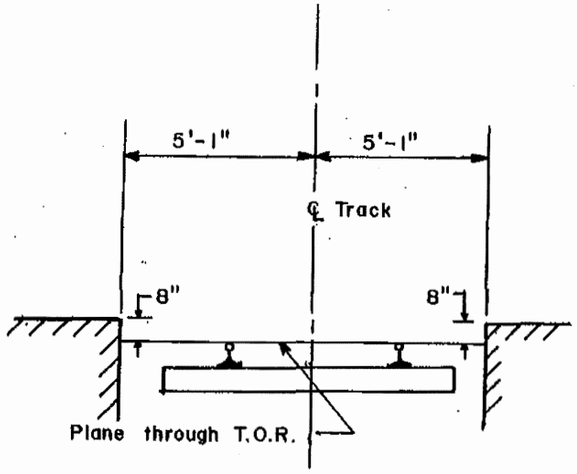
DWG. NO. 1018

Oct. 28, 1992 (2)
ISSUE DATE ISSUE NO.

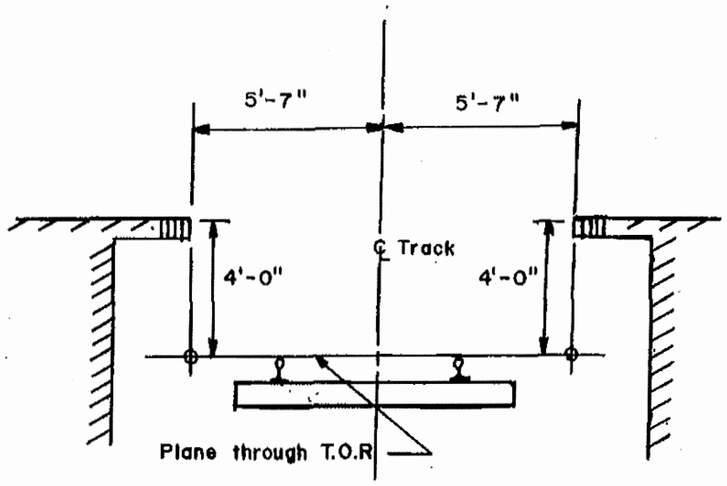
STANDARD TRACK CENTERS & SIDE CLEARANCE INCREASES FOR CURVED TRACK

John D. Kay
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



LOW PLATFORM

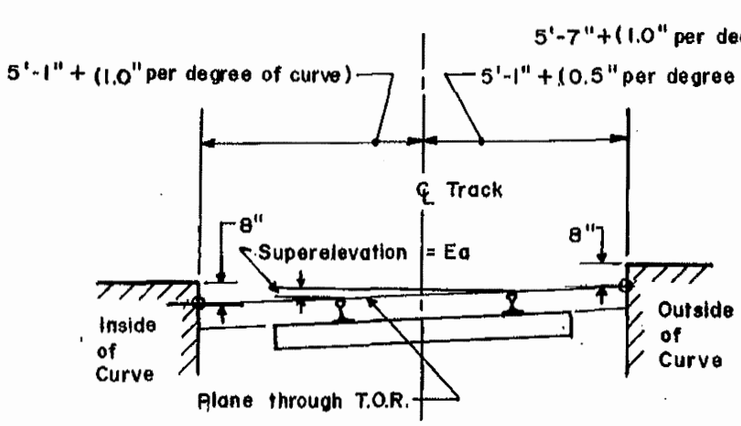


HIGH PLATFORM

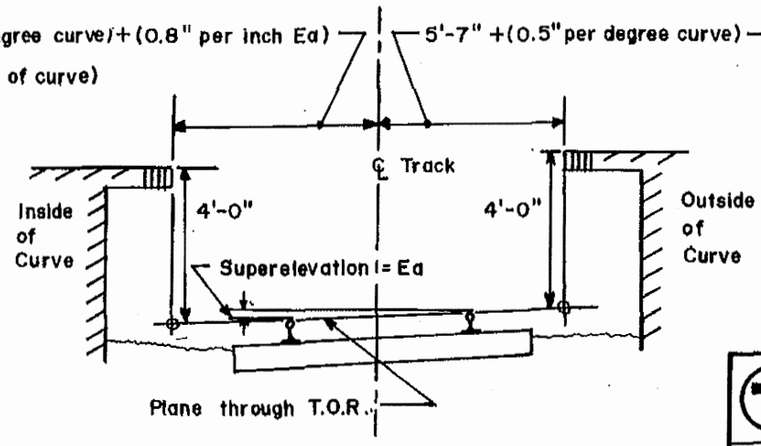
TANGENT TRACK

NOTES:

1. Where curvature is in excess of 2°-00' and/or superelevation is over 1", horizontal clearance to be reviewed by Chief Engineer Railroad Operations.
2. On certain through freight routes, additional side clearance must be provided for by the use of special fold-up platform edges made of material which will shatter or fold back if accidentally struck in a down position.



LOW PLATFORM


5'-7" + (1.0" per degree curve) + (0.8" per inch Ea)
5'-7" + (0.5" per degree curve) – (0.8" per inch Ea)
℄ Track
Inside of Curve
4'-0"
4'-0"
Outside of Curve
Superelevation = Ea
Plane through T.O.R.

HIGH PLATFORM

CURVED TRACK

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 1019

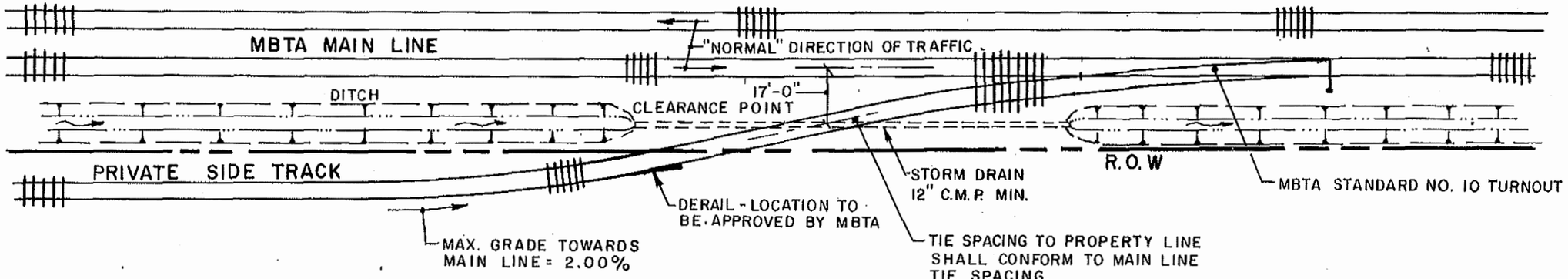
Oct. 28, 1992 (1)

ISSUE DATE ISSUE NO.

CLEARANCE AT PASSENGER PLATFORMS

John J. Williams
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



NOTES:

1. Turnout (T.O.) shall be 132 RE, welded, resiliently fastened per MBTA current standard with Hot Mixed Asphalt to be installed under all main line T.O.'s as per plan 1030.

2. No relay rail will be permitted on MBTA property, except with the express written permission of the MBTA and under no circumstances shall the rail differ from the main line rail in weight or section.

3. All T.O.'s shall be trailing point (as depicted) with respect to normal traffic direction unless otherwise permitted with the express written authorization from the MBTA.

4. MBTA forces (or their designee) shall perform all T.O. installation and trackwork on MBTA property to the property line.

5. In territory with concrete ties, those serviced by the sidetrack shall be responsible for the costs of removal of the concrete ties and additional Transition ties to maintain track integrity.

6. Sidetracks which slope down toward the main line shall not exceed a 2% grade (2ft. vertical per 100ft. linear).

7. Any sidetrack sloping toward the main line shall be equiped with a Split Switch Derail with installation and maintenance of the Derail the responsiblity of those serviced by the Sidetrack unless otherwise approved. Location of the Derail subject to MBTA approval.

8. Under no circumstances shall railroad cars or other equipment encroach beyond the clearance point and should clearance point be on MBTA property. No car or equipment shall be allowed to stand between the property line and the clearance point without the express written permission of the MBTA.

9. Unattended derails shall be kept locked at all times in the normal position (Derail "on") if the sidetrack is occupied by railroad cars.

10. Additional structures, such as bollards, may be necessary to protect the main line and the cost of these additional structures shall be borne by those serviced by the sidetrack.

11. The maximum curvature (calculated by chord definition) on sidetracks shall be a degree of curve not exceeding 12°30' unless otherwise allowed by the designated freight railroad servicing the sidetrack but in no case on MBTA property shall the degree of curve exceed 12°30'.

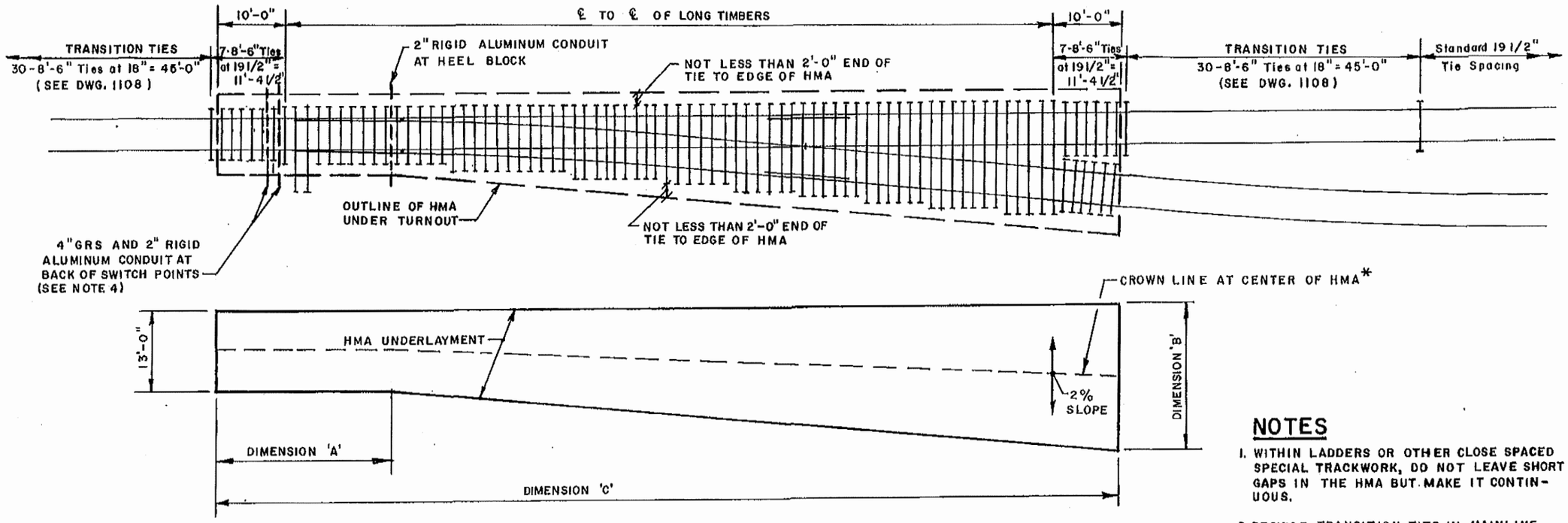
12. Existing drainage patterns shall be maintained (where necessary) by the installation of a pipe (12" min.) to facilitate drainage flow across Sidetrack area. Pipe shall have a flow capacity equal to the ditch and shall be reviewed by the MBTA on a site specific basis. Pipe shall be designed for railroad loadings (E-80) at expected depth below bottom of tie.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1020
		Oct. 28, 1992 (1)
		ISSUE DATE ISSUE NO.

SIDE TRACK INSTALLATION

John D. Day
ENGINEERING OFFICER

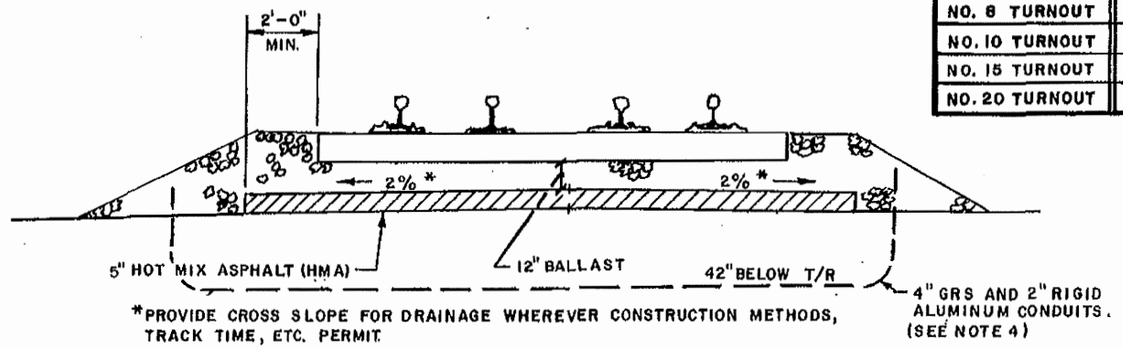
W. A. Loud
CHIEF ENGINEERING OFFICER


10'-0"
℄ TO ℄ OF LONG TIMBERS
10'-0"
TRANSITION TIES
30-8'-6" Ties at 18" = 45'-0"
(SEE DWG. 1108)
7-8'-6"Ties at 19 1/2" = 11'-4 1/2"
2" RIGID ALUMINUM CONDUIT AT HEEL BLOCK
NOT LESS THAN 2'-0" END OF TIE TO EDGE OF HMA
7-8'-6"Ties at 19 1/2" = 11'-4 1/2"
TRANSITION TIES
30-8'-6" Ties at 18" = 45'-0"
(SEE DWG. 1108)
Standard 19 1/2" Tie Spacing
OUTLINE OF HMA UNDER TURNOUT
NOT LESS THAN 2'-0" END OF TIE TO EDGE OF HMA
4"GRS AND 2" RIGID ALUMINUM CONDUIT AT BACK OF SWITCH POINTS (SEE NOTE 4)
CROWN LINE AT CENTER OF HMA*
13'-0"
HMA UNDERLAYMENT
2% SLOPE
DIMENSION 'B'
DIMENSION 'A'
DIMENSION 'C'

PLAN-TYPICAL TURNOUT INSTALLATION

TURNOUT SIZE	DIM. A	DIM. B	DIM. C	TONS OF HMA
NO. 8 TURNOUT	24'-2"	22'-7"	117'-6"	65
NO. 10 TURNOUT	24'-4"	22'-5"	136'-0"	76
NO. 15 TURNOUT	27'-8"	22'-3"	190'-4"	109
NO. 20 TURNOUT	42'-3"	22'-2"	252'-0"	139

(NOTE 3)


2'-0" MIN.
2% *
2% *
5" HOT MIX ASPHALT (HMA)
12" BALLAST
42" BELOW T/R
4" GRS AND 2" RIGID ALUMINUM CONDUITS. (SEE NOTE 4)
*PROVIDE CROSS SLOPE FOR DRAINAGE WHEREVER CONSTRUCTION METHODS, TRACK TIME, ETC. PERMIT.

TYPICAL SECTION

NOTES

1. WITHIN LADDERS OR OTHER CLOSE SPACED SPECIAL TRACKWORK, DO NOT LEAVE SHORT GAPS IN THE HMA BUT MAKE IT CONTINUOUS.
2. PROVIDE TRANSITION TIES IN MAINLINE TRACK ONLY. FOR ADDITIONAL DETAILS, SEE STANDARD DRAWING NO. 1108.
3. TONS OF HMA CALCULATED AS 0.059 TONS/S.Y./INCH THICKNESS OF HMA.
4. PROVIDE INDICATED CONDUITS AT ALL POWER TURNOUTS AND WHERE ELECTRIC SWITCH HEATERS ARE TO BE INSTALLED. SEE DRAWING NO. 3040 ALSO.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

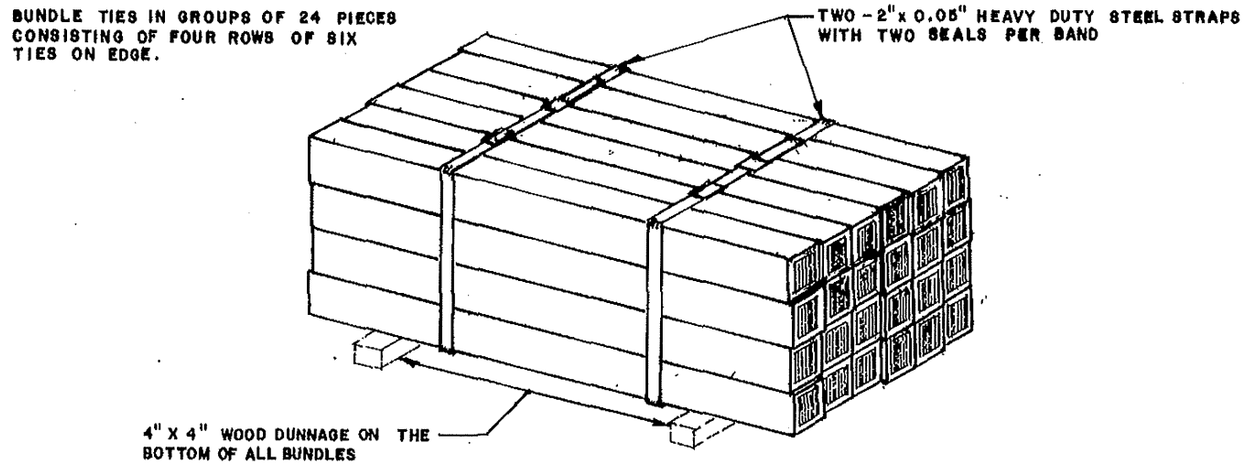
RAILROAD OPERATIONS

DWG. NO. 1030

Apr. 29, 1996 (3)
ISSUE DATE ISSUE NO.

ASPHALT UNDERLAYMENT AT TURNOUTS

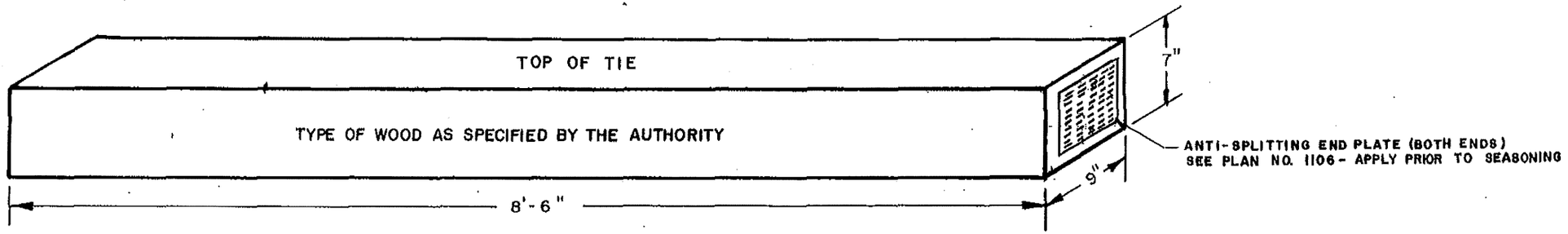
John D. Pacy
SECTION CHIEF


BUNDLE TIES IN GROUPS OF 24 PIECES CONSISTING OF FOUR ROWS OF SIX TIES ON EDGE.
TWO - 2" x 0.05" HEAVY DUTY STEEL STRAPS WITH TWO SEALS PER BAND
4" X 4" WOOD DUNNAGE ON THE BOTTOM OF ALL BUNDLES

BUNDLES FOR SHIPMENT

NOTES:

1. ALL TIES SHALL CONFORM TO MBTA STANDARD MATERIAL SPECIFICATIONS FOR CROSSTIES - TREATED.


TOP OF TIE
TYPE OF WOOD AS SPECIFIED BY THE AUTHORITY
7"
9"
8'-6"
ANTI-SPLITTING END PLATE (BOTH ENDS) SEE PLAN NO. 1106 - APPLY PRIOR TO SEASONING

STANDARD TIE

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 1100

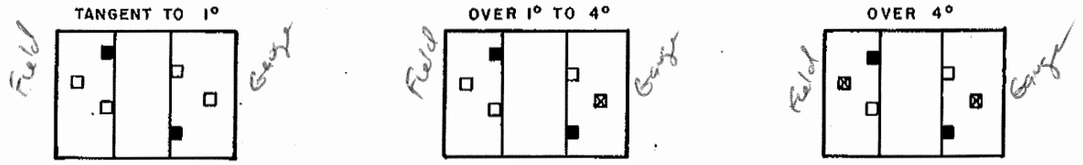
Oct. 28, 1992 (1)

ISSUE DATE ISSUE NO.

STANDARD TIMBER TIE

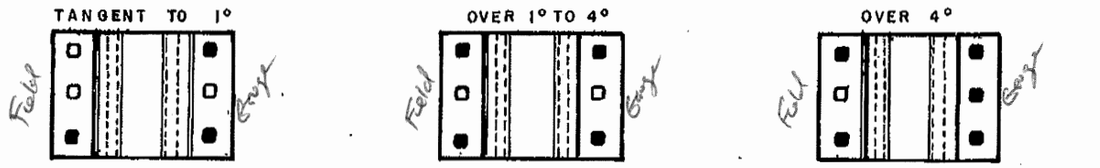
John D. Ray
ENGINEERING OFFICER

W A Lovell
CHIEF ENGINEERING OFFICER



STANDARD TIE PLATE (B-6 PUNCHING) WITH CUT SPIKES

■ INDICATES RAIL HOLDING SPIKES ⊠ INDICATES ADDITIONAL CUT SPIKES

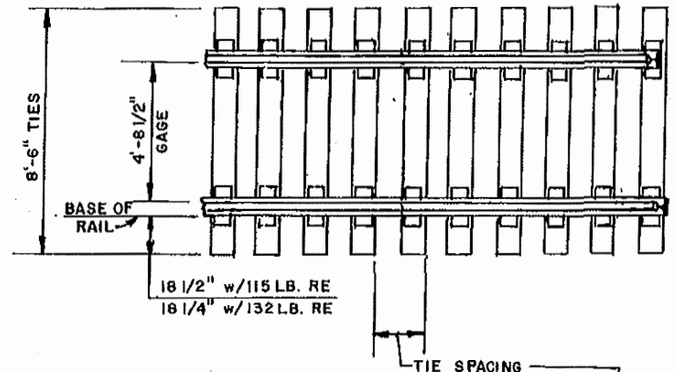


STANDARD RESILIENTLY FASTENED TIE PLATE

■ INDICATES USE OF LOCK SPIKE IN SPIKE HOLE
PREBORE HOLES FOR LOCK SPIKES, 9/16" DIA. x 6" DEEP.
DO NOT BORE HOLES ALL THE WAY THROUGH THE TIE.

NOTES:

1. LEFT SIDE OF ALL DEPICTED PLATES TO BE CONSIDERED THE FIELD SIDE WITH THE GAGE SIDE ON THE RIGHT.
2. SEE SHEET 1216 FOR LOCK SPIKE DETAIL.



TIMBER TIES	
STANDARD MAIN LINE TRACK	19 1/2"
WITHIN GRADE CROSSINGS*	18"
SECONDARY & YARD TRACK	22"
CONCRETE TIES	
STANDARD MAIN LINE TRACK	24"

* Ties within full depth rubber crossings shall be 9'-0" long. Temporary crossings may have 19½" spacing. Use 18" spacing within transition areas as shown on drawing no. 1108.

STANDARD TIE SPACING

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

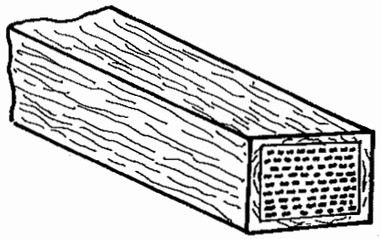
RAILROAD OPERATIONS

DWG. NO. 1104

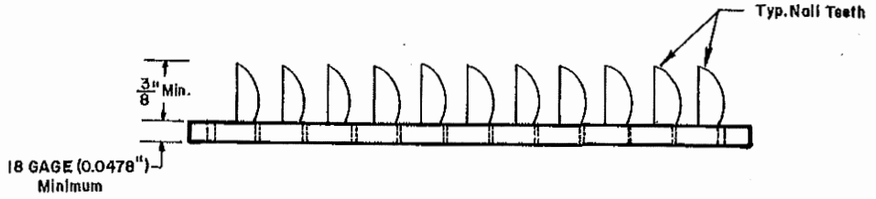
Jan. 5, 1996 (2)
ISSUE DATE ISSUE NO.

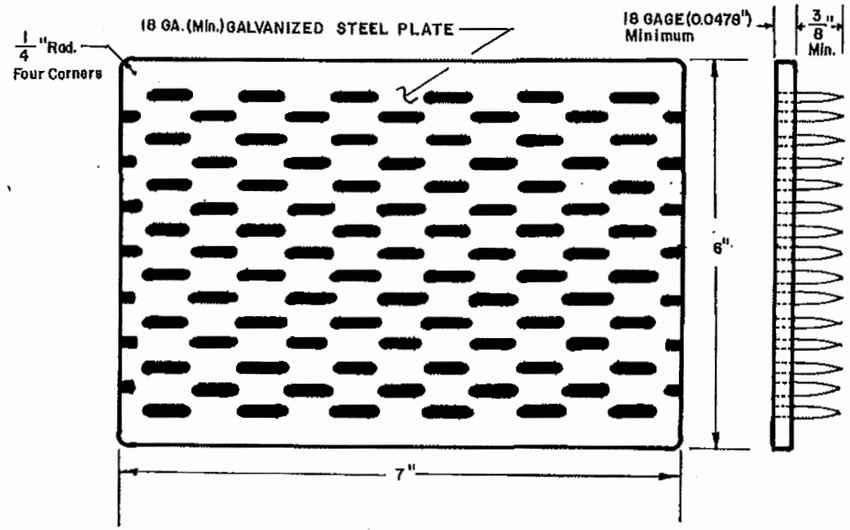
TIE SPACING AND SPIKING PATTERNS

John D. Kay
SECTION CHIEF



TYPICAL TIE END VIEW





TYPICAL ANTI – SPLITTING END PLATE

NOTES:

1. The Anti-Splitting End Plate (ASEP) shall be manufactured from a minimum 18 Ga. (0.0478") galvanized steel plate, hot dipped.

2. The ASEP shall have nail teeth not less than 3/8" in length and of sufficient sharpness to fully penetrate hardwood timbers used for cross ties.

3. The ASEP shall be machine applied to the ends of a tie with uniform pressure and minimum teeth bending and shall be applied so that the nail teeth side ofthe plate is flush with end surface of the tie.

4. The ASEP is to be applied to new ties prior to seasoning.

5. The center of the ASEP is to be applied not more than 1/2" off the horizontal and vertical centerline intersections of the tie end.

6. The ASEP shall be fabricated in such a way that the teeth twist vertically to allow a better grip in the tie.

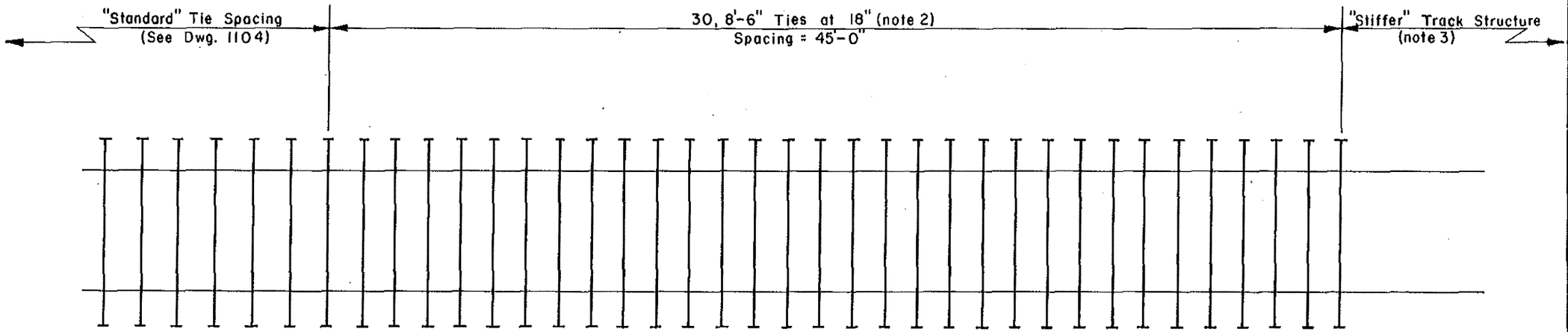
7. Mark and install plates to indicate location of Heartwood (KERF Marks).

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1106
		Oct. 28, 1992 (2)
		ISSUE DATE / ISSUE NO.

ANTI-SPLITTING END PLATE FOR CROSSTIES & SWITCH TIMBER

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



NOTES :

1. Use Transition Ties whenever there is a significant change in track Modulus (Stiffness).
2. Tie spacing dimension is shown for speeds up to 60 mph. For speeds greater than 60 mph, increase as follows:

   70 mph – 35 Ties at 18" = 52'-6"
   80 mph – 40 Ties at 18" = 60'-0"

3. "Stiffer" Track Structure consists of any of the following:

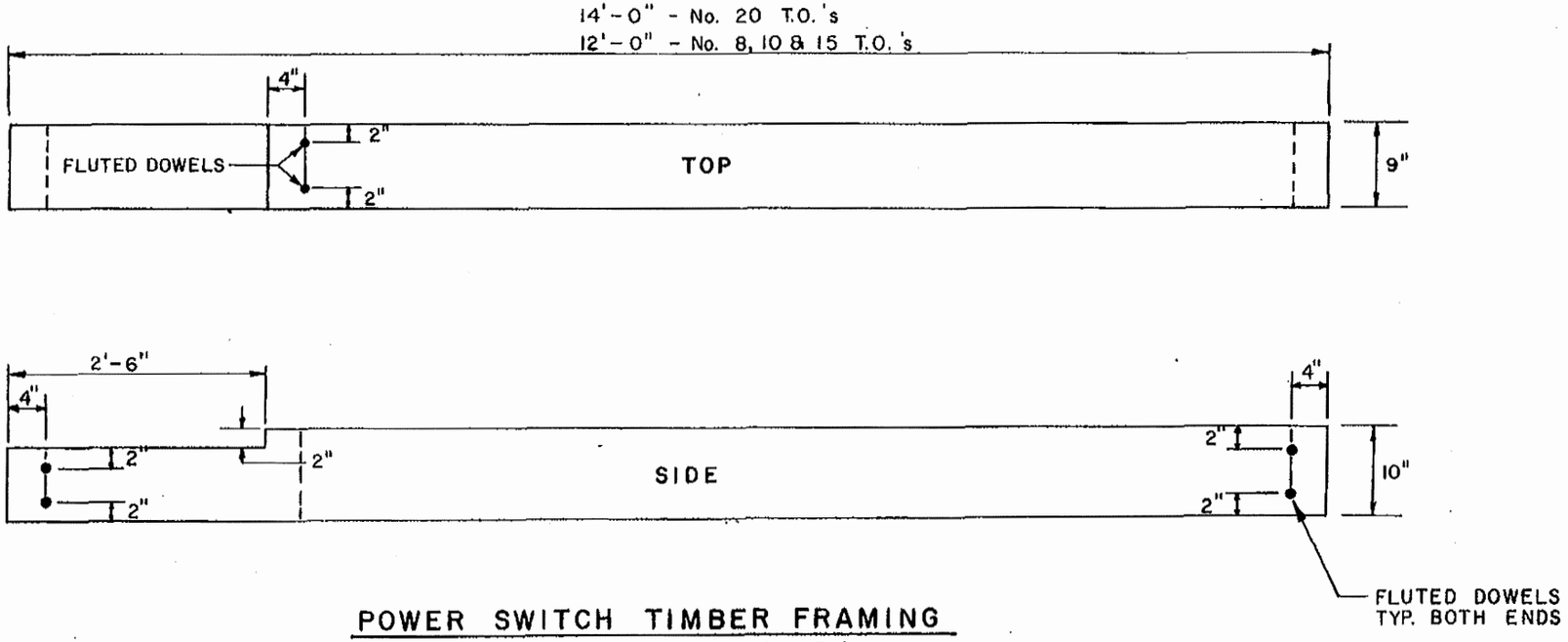
   a. Concrete Ties
   b. Bridge or Approach Slab
   c. Hot Mix Asphalt Underlayment (Grade Crossing or Turnout)
   d. Direct Fixation Track Construction

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1108
		Oct. 28, 1992 (1)
		ISSUE DATE / ISSUE NO.

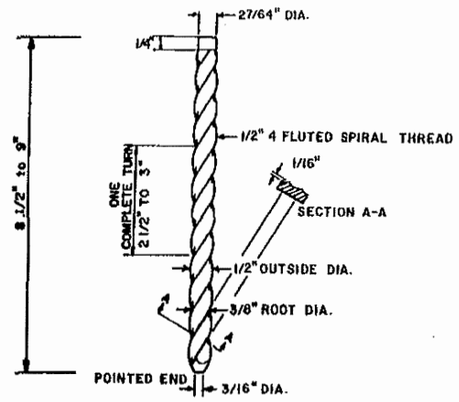
TRANSITION TIES

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



POWER SWITCH TIMBER FRAMING
(TWO TIMBERS PER MACHINE)



FLUTED STEEL TIE DOWELS
(6 per Headblock)

NOTES:

1. DETAILS ON THIS DRAWING APPLY ONLY TO TURNOUTS TO BE OPERATED BY A SWITCH MACHINE.
2. 14'-0" HEADBLOCKS REQUIRED ON NO. 20 TURNOUTS TO ACCOMODATE HELPER MECHANISM.

ANTI-SPLIT DOWEL NOTES

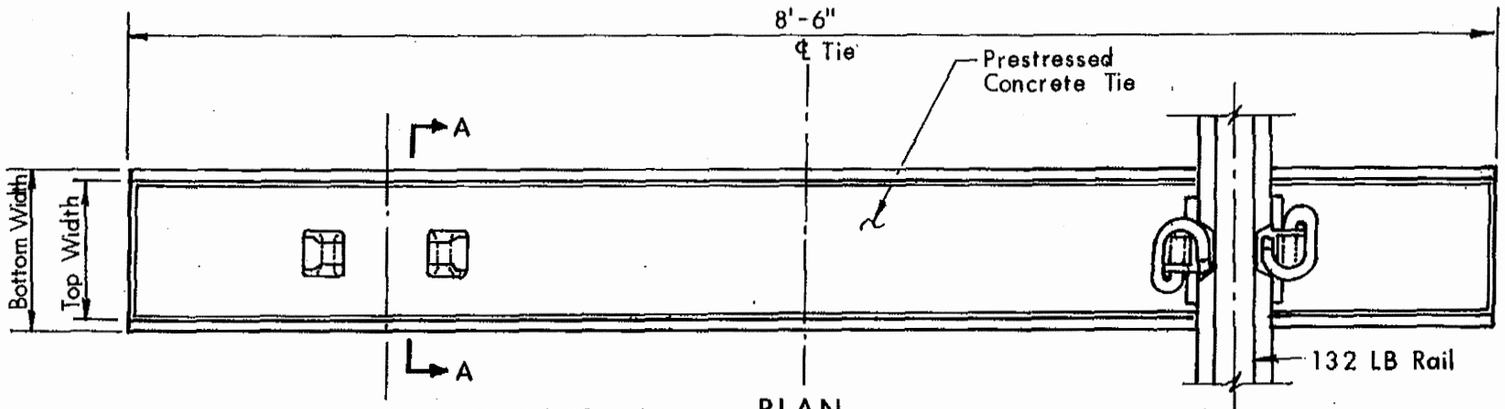
1. USE OF LUBRICANTS TO ASSIST IN DRIVING DOWEL IS PROHIBITED.
2. LOCATION OF DOWELS SHALL BE AS SHOWN.
3. MINIMUM LENGTH OF HOLES TO ACCEPT DOWELS SHALL BE EQUAL TO THE LENGTH OF DOWEL, AND THE SIZE OF THE DRILLED HOLES MUST NOT EXCEED 3/8 INCH IN DIAMETER.
4. DOWELS MUST BE COMPLETELY DRIVEN.
5. DOWELS ARE TO BE MADE OF COPPER BEARING STEEL A.S.T.M. A107.
6. TOLERANCE ON DIAMETERS OF 1/64" PLUS OR MINUS IS PERMITTED.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY | RAILROAD OPERATIONS | DWG. NO. 1110

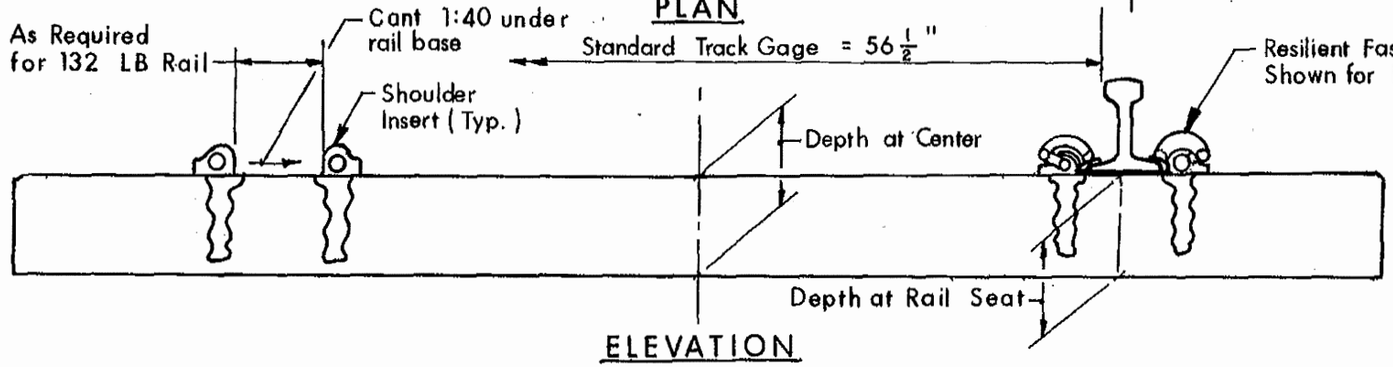
Apr. 29, 1996 (3)
ISSUE DATE | ISSUE NO.

HEADBLOCK TIE LAYOUT & DAPPING DETAILS

John D. Ray
SECTION CHIEF



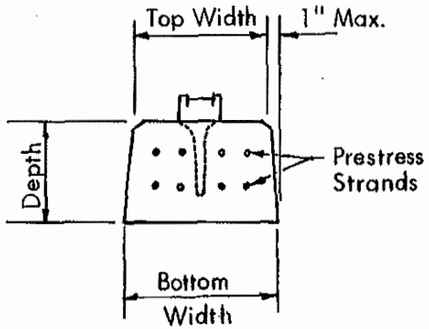
PLAN



ELEVATION

NOTES:

1. Ties shall be permanently labeled by indented or raised characters on the top surface to identify the following:
   - Manufacturers Identification
   - Line Number
   - Form Number
   - Cavity Number
   - Year of Manufacture
   - Date Code
   - Rail Seat Size
2. Weight of Tie shall not exeed 800 lbs.
3. Conc. Strength (f_c), 7,000 p.s.i. min. at 28 days.



SECTION A-A

Description \ Dimension	Minimum	Maximum	Tolerance
Top Width	9"	10"	±1/8"
Bottom Width	11"	12"	± 1/8"
Depth at Center	7"	10"	+1/4"-1/8"
Depth at Seat	9 1/2"	10 1/2"	+1/4"-1/8"

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

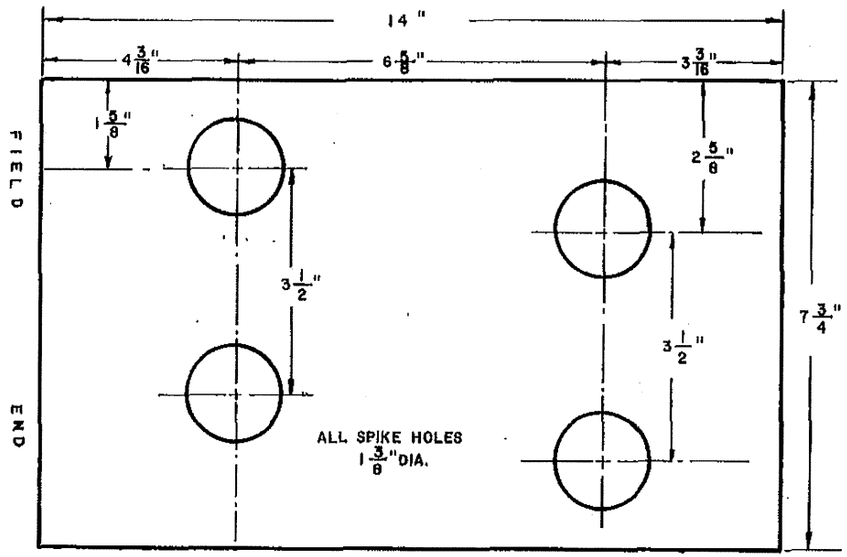
DWG. NO. 1120

Oct. 28, 1992 (2)
ISSUE DATE ISSUE NO.

CONCRETE TIE

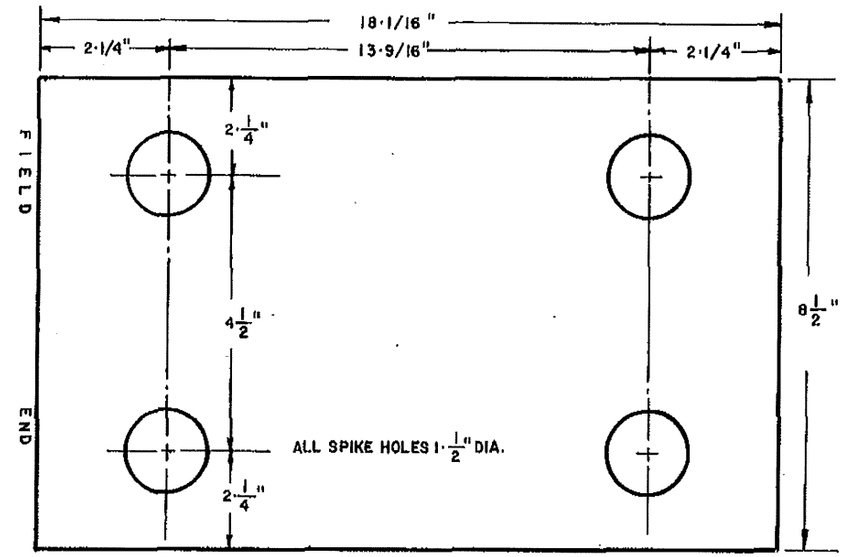
John D Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



WOOD SHIM FOR TIE PLATES

As Shown Dimensions Will Fit Either 132lb or 115 lb Plate (B-6 Punching Only).



WOOD SHIM FOR RESILIENTLY FASTENED TIE PLATE

As Shown Dimensions Will Fit Either 132lb or 115lb Plate

NOTES:

1. Shims shall be made of sawed, sound hardwood or marine plywood - prebored as shown.

2. A variation of 1/4" more or 1/16" less is allowable in length or width with length, width & depth uniform (no wedge shape allowed in any direction).

3. Thickness of shims shall be in 1/4" increments from 1/2" to 1 3/4".

4. Wood shims not exceeding 1" in thickness may be secured using a standard 6" cut spike but shimming exceeding 1" must be secured using special 8" track spikes.

5. For additional data on use and installation, see drawing 1204 and MW-1Manual, SECTIONS 213.129 and 213.131.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 1200

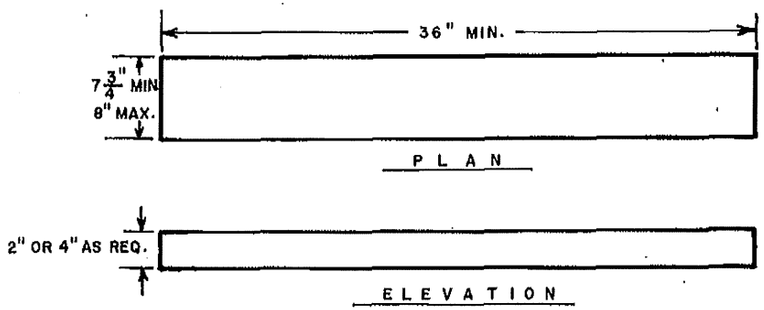
Oct. 28, 1992 (1)

ISSUE DATE ISSUE NO.

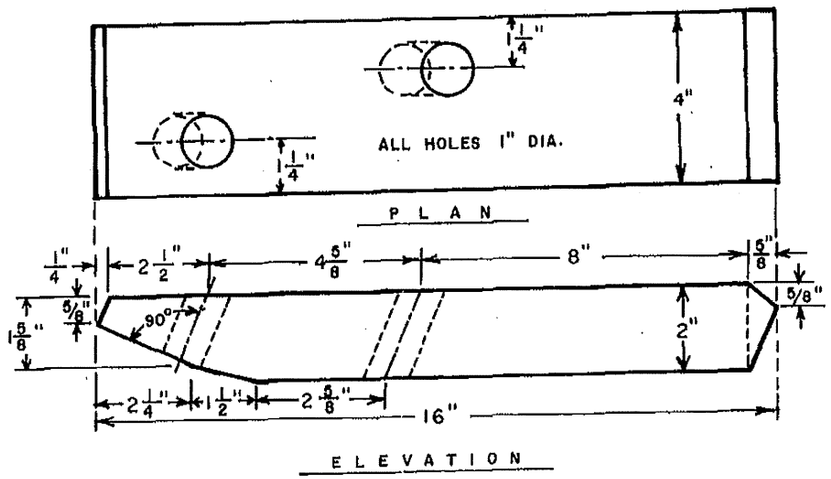
WOOD SHIMS FOR TIE PLATES

John D. Kay
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



TYPICAL PLANK BLOCK



TYPICAL WOOD RAIL BRACE

NOTES:

1. Plank blocks are to conform to the dimensional specifications for wood shims (drawing 1200) contained in these standard plans except that plank blocks are to be made from hard wood with additional plate holding spike hole(s) to be bored in the field.

2. Plank blocks are to be applied directly on top of the tie beneath the rail and the tie plate and secured to the tie with spikes as required to penetrate the tie at least 4 inches.

3. When a rail is shimmed 2" or more, a combination of shims and 2" or 4" plank block must be used with the wood shims on top of the plank and secured to it as with 10d or 20d nails depending on thickness of shim.

4. When Plank blocks are used (min. length to be 36"), they are to be applied with one end flush with the end of the tie and spiked to the tie using at least four 8" Boat spikes using 5/8" diameter spike holes bored in the field.

5. If the elevation change permits, full tie length plank blocks shall be used wherever possible.

6. Wood shims not exceeding 1" in thickness may be secured using a standard 6" cut spike but shimming exceeding 1" must be secured using special 8" track spikes.

7. When a rail is shimmed more than 1 1/2" it must be securely braced at least every third tie for the full length of the shimming.

8. Braced and/or shimmed track should be checked frequently for alignment, gage, and cross level as well as to assure that the braces and/or shims are tight.

9. It should be stressed that shimming and blocking should be considered a method of last resort in correcting rail elevation mismatch problems when the track subgrade is frozen and cannot be worked.

10. Record of Shim/Block installations must be maintained in the office of Engineer of Track.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

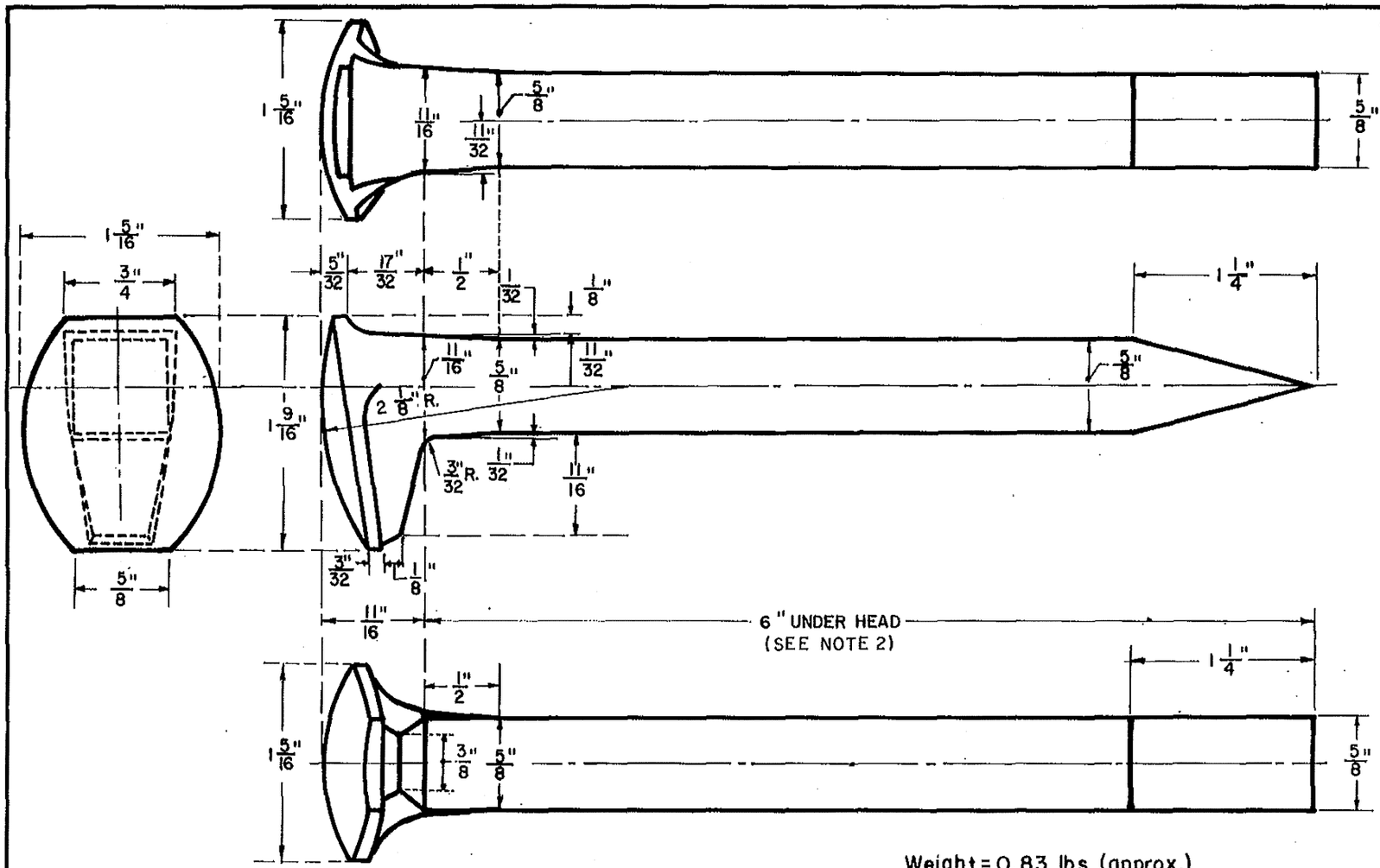
DWG. NO. 1204

Oct. 28, 1992 (1)
ISSUE DATE ISSUE NO.

FROST BRACING AND BLOCKING

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



NOTES:

1. See A.R.E.A. Specifications for Soft Steel Track Spikes for Process, Chemical Composition, Tensile Properties, Bending Properties, and other standards.
2. Spikes used for frost shims shall have a length dimension of 8" under the head.
3. Spikes shall be shipped in steel kegs which do not exceed a weight of 200 lbs.

Weight = 0.83 lbs (approx.)
Approx. 240 Spikes per 200 lb. keg

STANDARD CUT TRACK SPIKE

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 1210

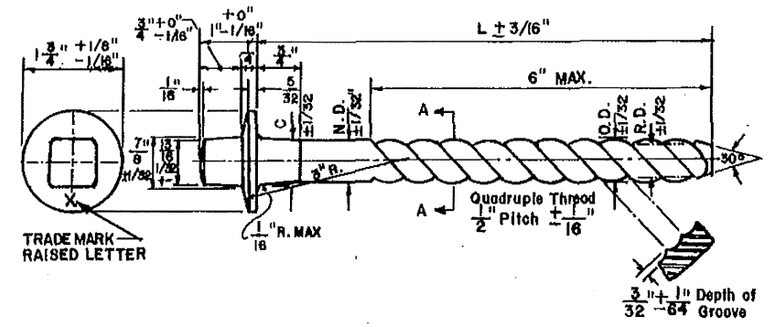
Oct. 28, 1992 (2)

ISSUE DATE ISSUE NO.

CUT SPIKE

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



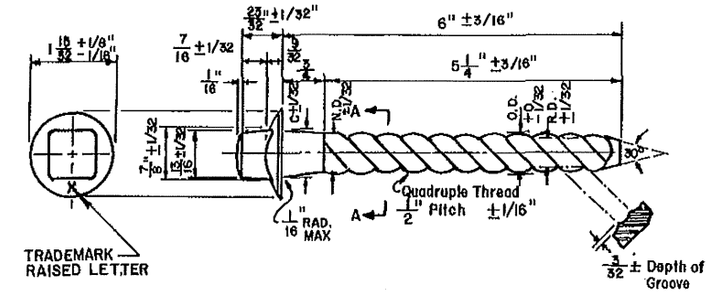
DESCRIPTION	* N.D. – NOMINAL DIAMETER		
	5/8"	11/16"	3/4"
O.D. OF THREAD	23/32"	25/32"	27/32"
R.D. ROOT DIAMETER	17/32"	19/32"	21/32"
C – TOP OF CONE NECK	11/16"	25/32"	13/16"

NOTE
* Order By Nominal Diameter And Length Under Head

SECTION A–A

A.R.E.A. WASHER-HEAD TIMBER DRIVE SPIKE

Not to Scale



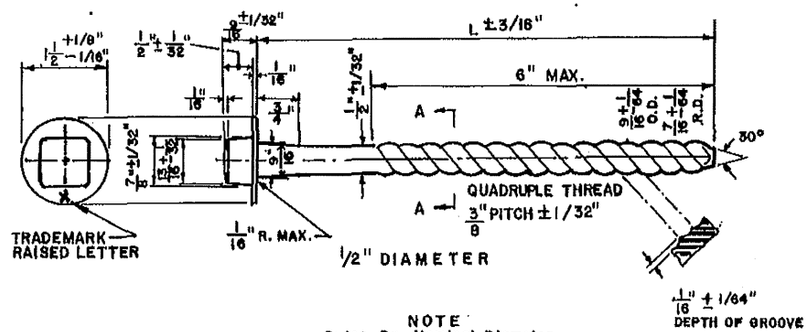
DESCRIPTION	† N.D. NOMINAL DIAMETER	
	11/16"	3/4"
O.D. OF THREAD	23/32 MAX.	25/32 MAX
R.D. – ROOT DIAMETER	17/32"	19/32"
C – TOP OF CONE NECK	25/32"	27/32"

NOTES
Other Lengths Procurable
† Order by Nominal Diameter. Designed to Fit 11/16" and 3/4" Square and Round Holes

SECTION A–A

A.R.E.A. CONE-NECK DRIVE SPIKE

Not to Scale

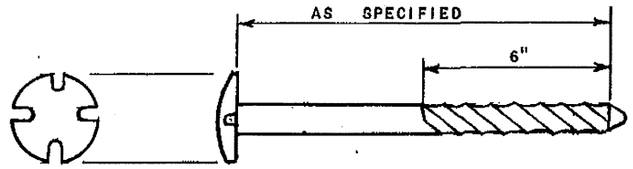


NOTE
Order By Nominal Diameter And Length Under Head.

SECTION A–A

A.R.E.A. TIMBER DRIVE SPIKE

Not to Scale



SPIKE DIAMETER	HEAD DIAMETER	HEAD THICKNESS	LENGTH
1/2" Nominal Diameter	2"	19/64"	6", 8", 10" or 12"
5/8" " "	2 1/2"	11/32"	8" to 14"
3/4" " "	2 1/2"	11/32"	8" to 14"

DOME HEAD DRIVE SPIKE

Not to Scale

NOTE:
ALL DRIVE SPIKES TO CONFORM TO CURRENT A.R.E.A. SPECIFICATIONS FOR STEEL DRIVE SPIKES, CHAPTER 5, MISCELLANEOUS PART.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

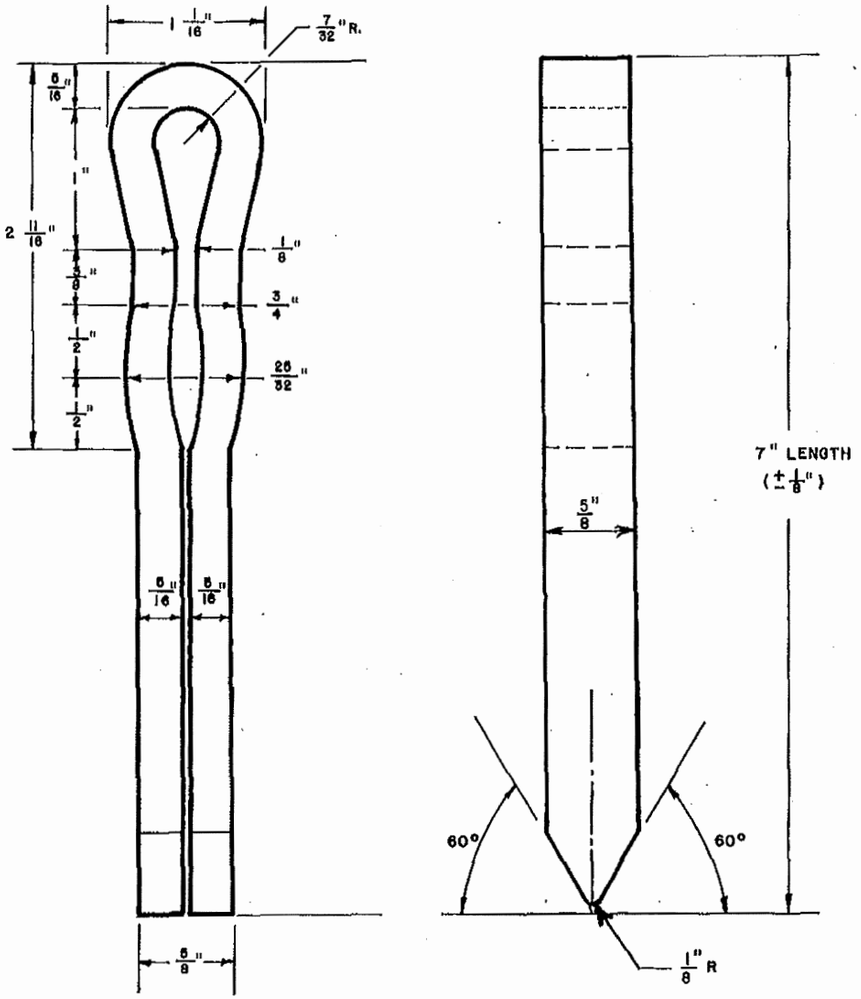
DWG. NO. 1214

Oct. 28, 1992 (1)
ISSUE DATE ISSUE NO.

TIMBER DRIVE SPIKES

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



LOCK SPIKE FOR TIE PLATE

NOTE:

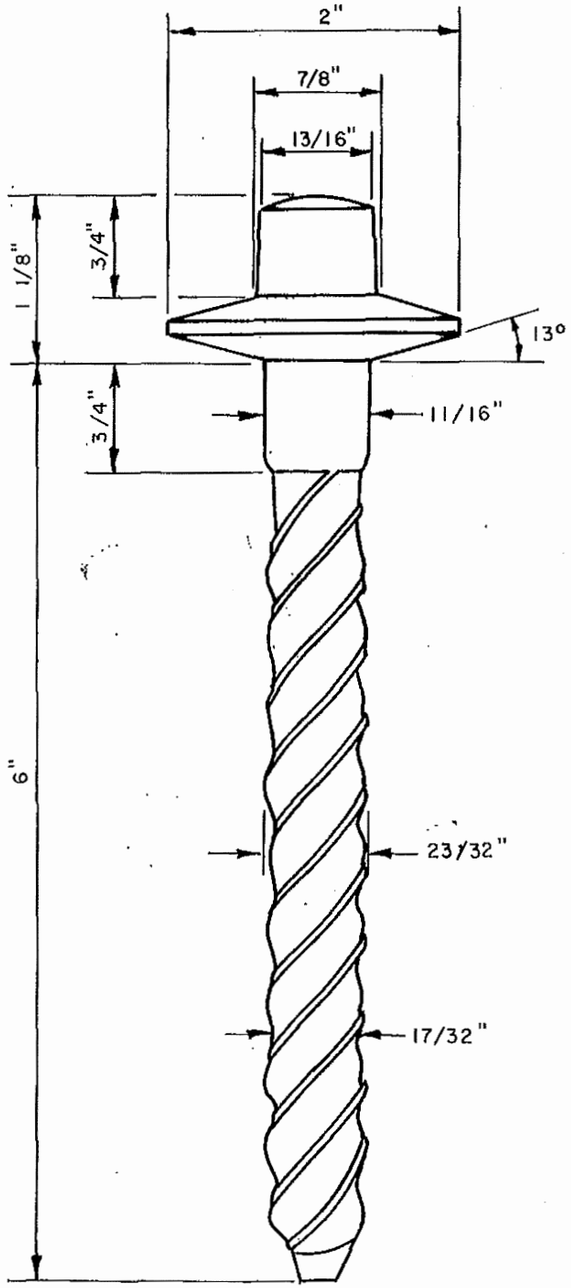
1. Lock Spikes shall be manufactured from 5/8" X 5/16" alloy spring steel with a minimal tensile strength of 160,000 p.s.i. and elongation of 25 %.
2. When Lock Spikes are driven into an 11/16" square spike hole (in free air), the legs shall open 1/8." (minimum).
3. For Spiking patterns, see drawing NO. 1104

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1216
		Oct. 28, 1992 (2)
		ISSUE DATE / ISSUE NO.

LOCK SPIKE FOR TIE PLATES

John D. Ray — ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



NOTES:

1. Track Drive Spikes shall be hot forged from medium carbon steel conforming with ASTM A-66.

2. Prebore holes either 7/16" or 1/2" in dia. Drive spike with hammering force only.

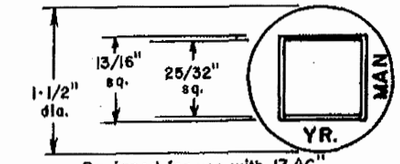
3. Track Drive Spikes shall be used instead of cut spikes within turnouts at locations where resilient fasteners cannot be applied. This includes frog guard rails and plates just beyond the heel of switch.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1217
		Oct. 28, 1992 (1)
		ISSUE DATE / ISSUE NO.

TRACK DRIVE SPIKE

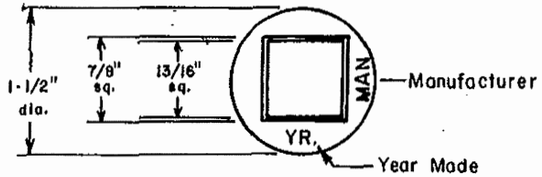
John D. Ray
ENGINEERING OFFICER

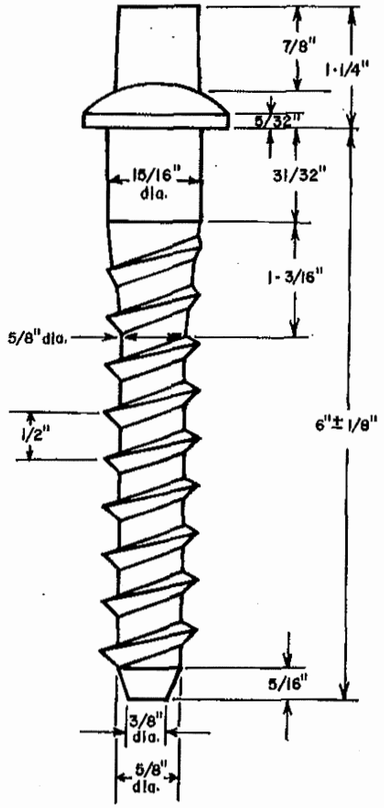
CHIEF ENGINEERING OFFICER



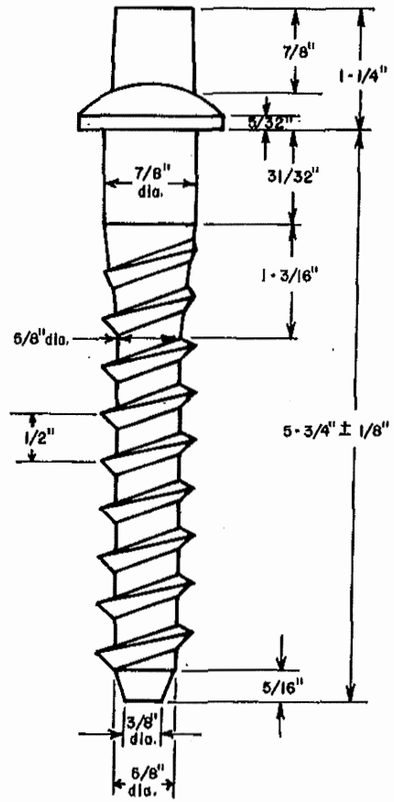
Designed for use with 13/16" socket.

Designed for use with 7/8" socket.





15/16" SCREW SPIKE



7/8" SCREW SPIKE

NOTES:

1. SCREW SPIKES SHALL BE FORGED FROM MEDIUM CARBON STEEL CONFORMING WITH ASTM A-66.
2. UNLESS OTHERWISE SPECIFIED, FURNISH 7/8" DIAMETER SCREW SPIKES
3. APPROXIMATE WEIGHT = 1.1 IBS.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

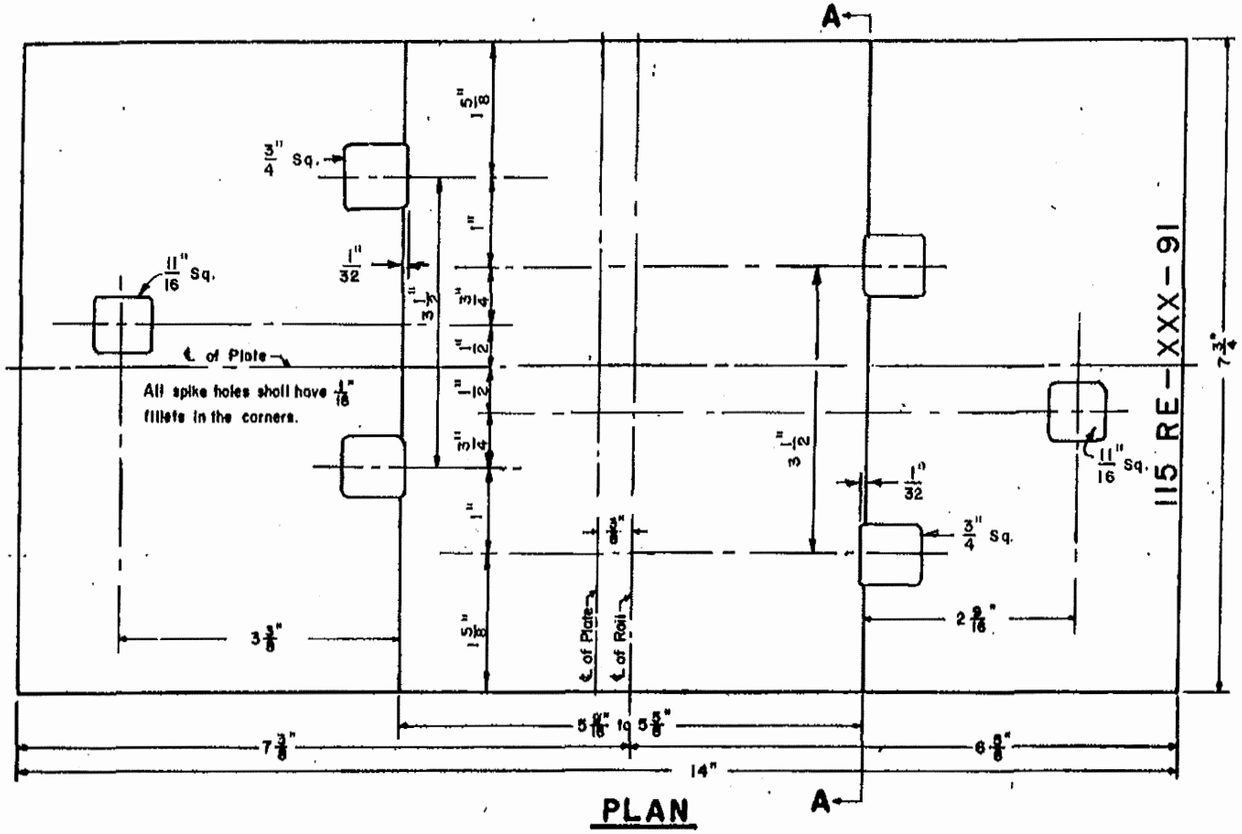
DWG. NO. 1218

Oct. 28, 1992 (1)
ISSUE DATE ISSUE NO.

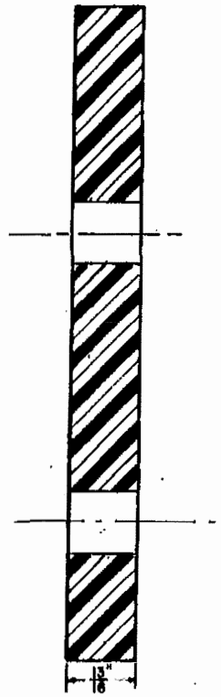
SCREW SPIKES

John B. Reay
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



PLAN

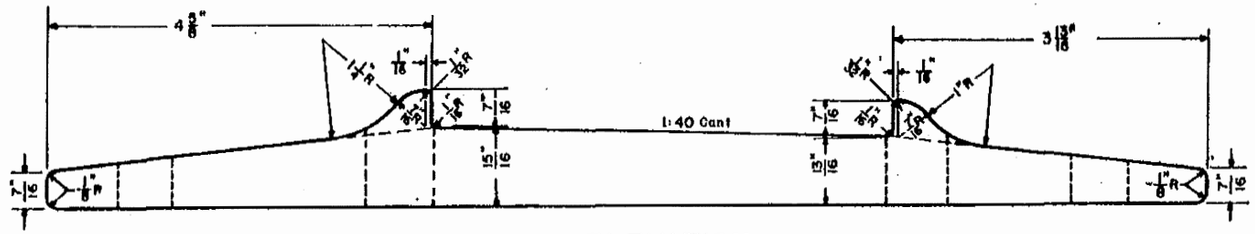


SECTION A-A

NOTES

Tie plates shall conform to the current AREA "Specifications for Low-Carbon Steel Tie Plates."

Tie plates shall be branded with the figures 115RE to designate the section, three letters or a trade mark to indicate the producer and two figures being the last two digits of the year rolled. Lettering shall be on the gage side of the plate.



ELEVATION

Calculated Weight 23.06 lbs.

AREA PLAN NO. 8 WITH B-6 PUNCHING

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 1220

Oct. 28, 1992 (2)

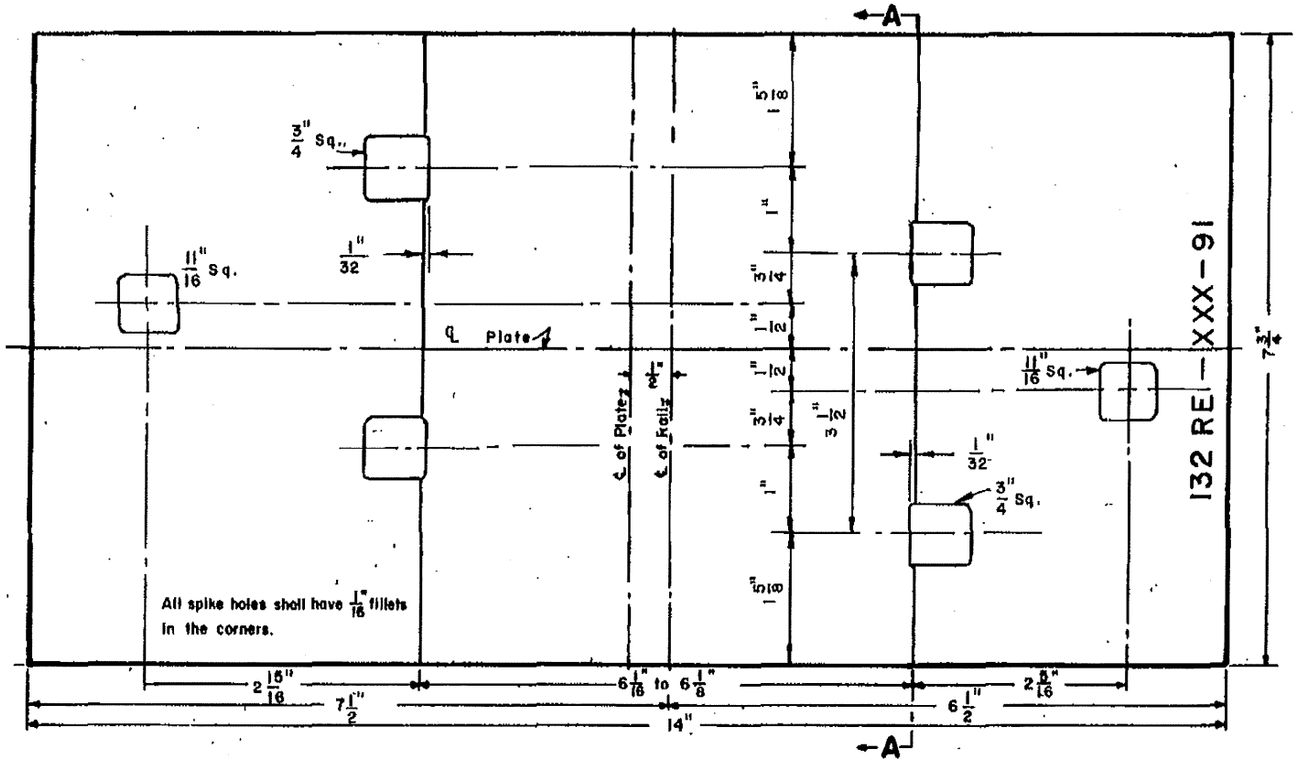
ISSUE DATE ISSUE NO.

TIE PLATE FOR 115 LB RE RAIL

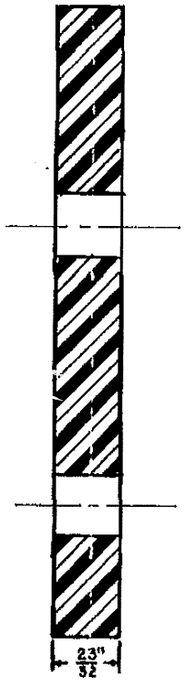
John D. Ray — W. A. Zarkadas

ENGINEERING OFFICER

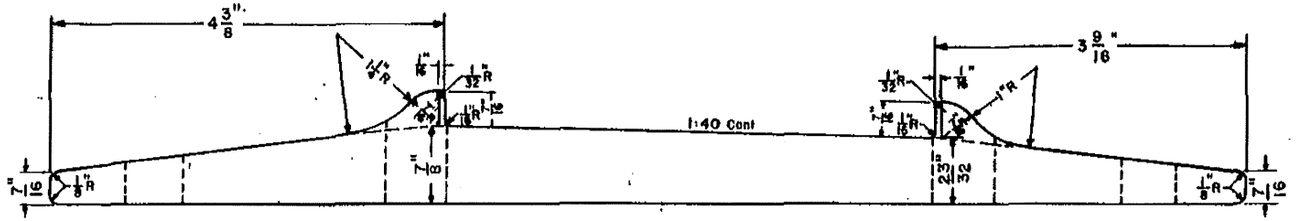
CHIEF ENGINEERING OFFICER



PLAN



SECTION A-A



ELEVATION

Calculated Weight 21.62 lbs.

AREA PLAN NO. 12 WITH B-6 PUNCHING

NOTES

Tie Plates shall conform to the current A.R.E.A. "Specifications For Low-Carbon Steel Tie Plates."

Tie Plates shall be branded with the figures 132 RE to designate the section; three letters or a trade mark to indicate the producer, and two figures being the last two digits of the year rolled. Lettering shall be on gage side of the plate.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 1222

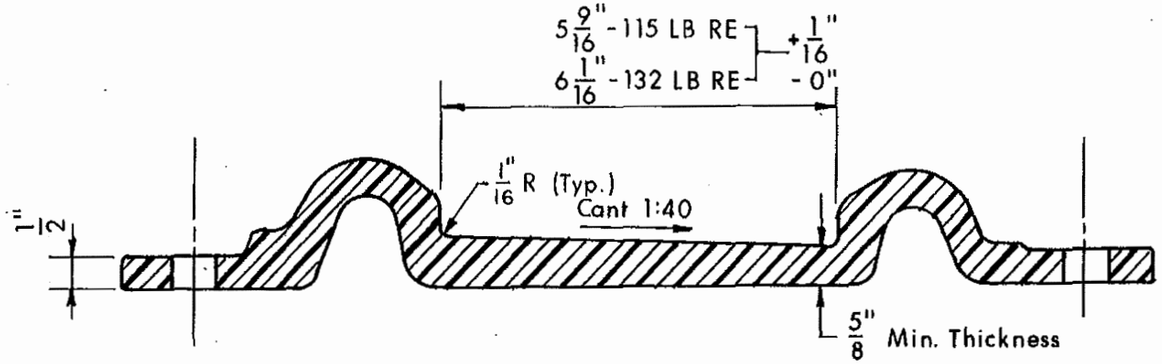
Oct. 28, 1992 ISSUE DATE

(2) ISSUE NO.

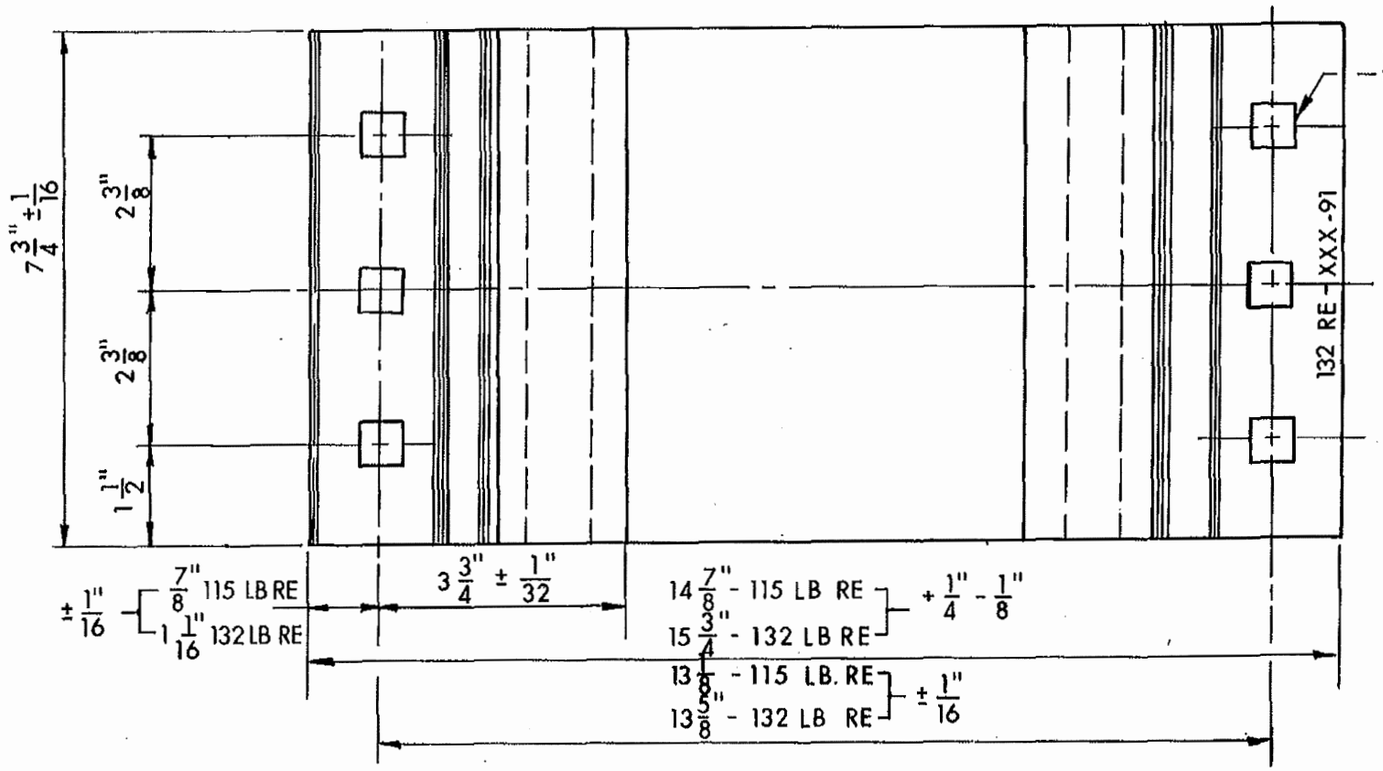
TIE PLATE FOR 132 LB R E RAIL

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



SECTION



PLAN

NOTES:

1. Tie Plates shall conform to current A.R.E.A. Specifications.
2. Tie Plates shall be branded either 115 or 132 to designate the section, three letters or a trademark to indicate the producer and two figures being the last two digits of the year rolled. Lettering shall be on the gage side of the plate.
3. Material shall be Low-Carbon Steel.

Calculated Weight (Approx.) of Punched Plate

115 LB RE -------- 23.40 lbs.
132 LB RE -------- 24.48 lbs.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

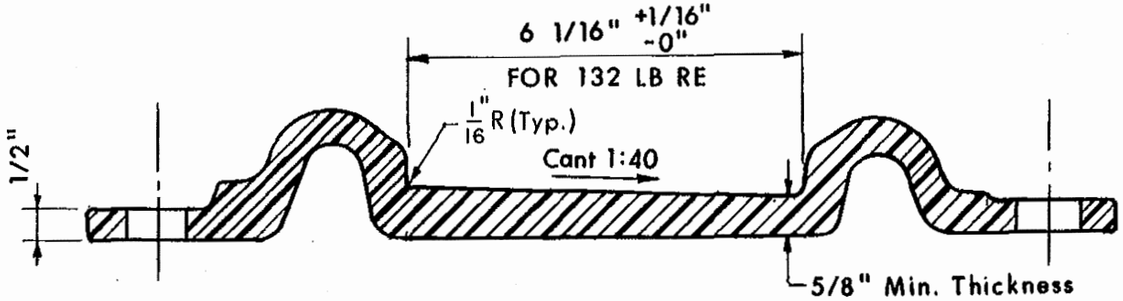
DWG. NO. 1224

Oct. 28, 1992 (ISSUE DATE) (2) (ISSUE NO.)

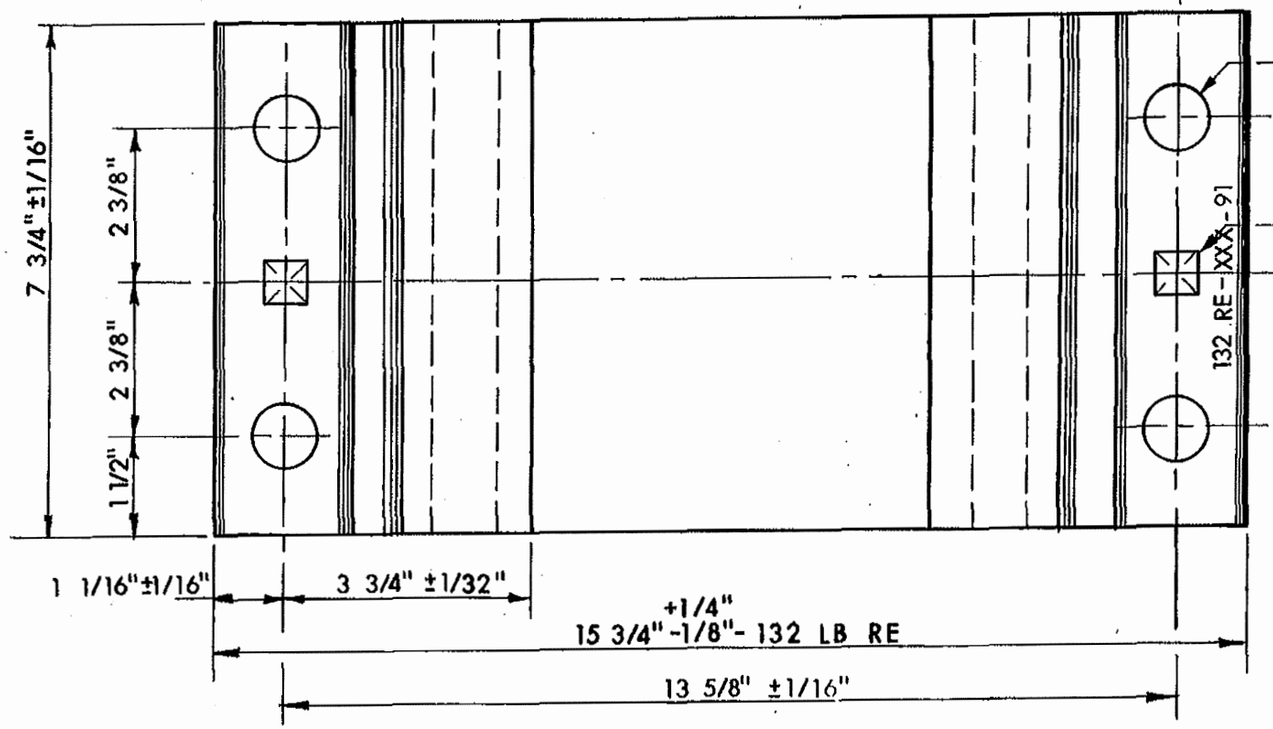
RESILIENT FASTENER TIE PLATE FOR LOCK SPIKES

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



SECTION



4 Outside holes shall be 15/16" dia. round holes to fit 7/8" dia. screw spikes.

2 Center holes marked ☒ shall be 11/16" sq. holes. ±1/32"

PLAN

Calculated Weight (Approx.) of Punched Plate
132 LB. R.E ----24.36 Lbs.

NOTES:

1. Tie Plates shall conform to current A.R.E.A. Specifications.
2. Tie Plates shall be branded 132 to designate the section, three letters or a trademark to designate the producer and two figures being the last two digits of the year rolled. Lettering shall be on the gage side of the plate.
3. Material shall be Low-Carbon Steel.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

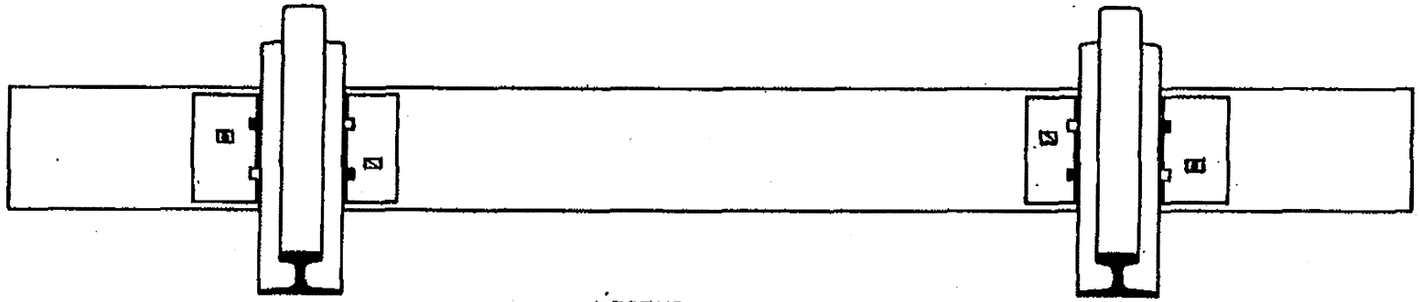
DWG. NO. 1225

Oct. 28, 1992 (1)
ISSUE DATE ISSUE NO.

RESILIENT FASTENER TIE PLATE FOR SCREW SPIKES

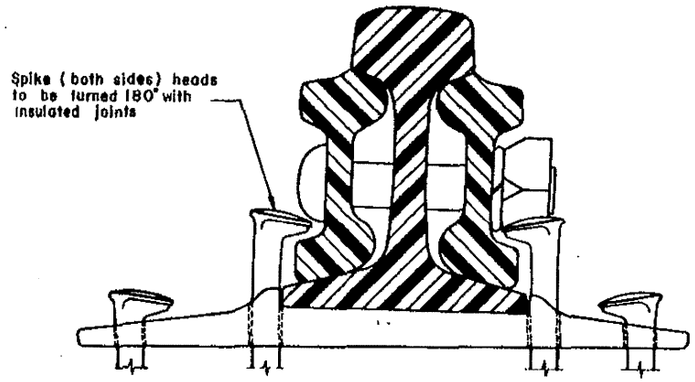
John D. Reay
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER

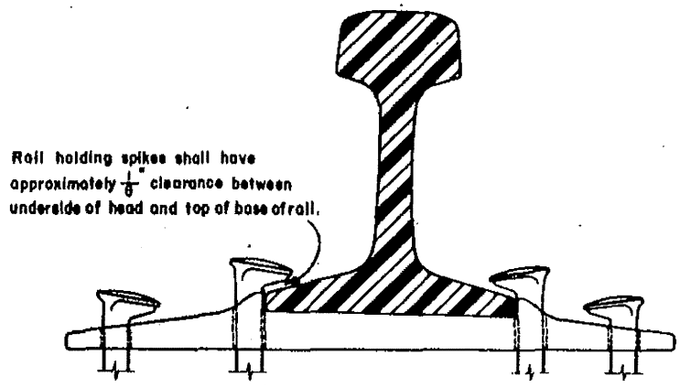


LEGEND

- ■ Indicates Rail Holding Spikes In All Cases
- ⊠ " 1st Plate Holding Spike (Where Only One Is Required).
- ⊡ " 2nd Plate Holding Spike (Where Two Are Required).



SPIKE APPLICATION WITHIN JOINT BAR LIMITS



SPIKE APPLICATION OF RAIL AND PLATE HOLDING SPIKES

(Tangent and Curved Track)

NOTES:

1. Spiking on bridges and trestles shall be the same as for standard ballasted track.
2. For spiking patterns, see drawing NO. 1104

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 1230

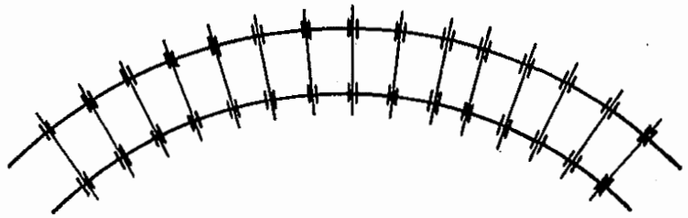
Oct. 28, 1992 (2)

ISSUE DATE ISSUE NO.

SPIKING ARRANGEMENT FOR TIE PLATES

John D. Ray
ENGINEERING OFFICER

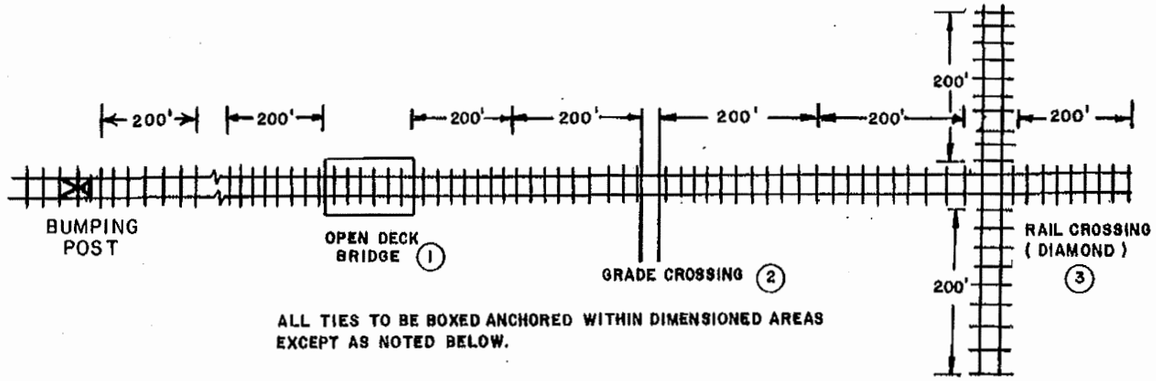
W. A. Nolan
CHIEF ENGINEERING OFFICER



CWR WITH CURVES 3° AND OVER

RAIL ANCHORING PATTERN FOR JOINTED RAIL IN 39' LENGTHS WITH TRAFFIC IN BOTH DIRECTIONS

(32 ANCHORS PER 39 FOOT LENGTH OF TRACK) (4) & (5)



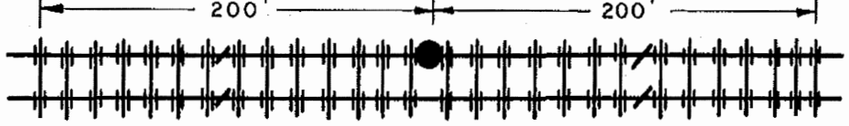
ALL TIES TO BE BOXED ANCHORED WITHIN DIMENSIONED AREAS EXCEPT AS NOTED BELOW.

RAIL ANCHORING FOR OPEN DECK BRIDGES, GRADE AND RAIL CROSSINGS AND BUMPING POSTS WITH C.W.R. OR JOINTED RAIL

Anchoring Patterns Shown are for Cut-Spike Fastened Track. Rail Fastened with Approved Resilient Fasteners Does Not Need Anchors As Shown on This Drawing.

NOTES

1. OPEN DECK OR THROUGH DECK BRIDGES ARE NOT TO BE ANCHORED ACROSS THE SPAN EXCEPT UNDER THE PROVISIONS OF THE MBTA'S MW-1 OR WITH AUTHORIZATION OF THE CHIEF ENGINEER.
2. GRADE CROSSINGS ARE NOT TO BE ANCHORED WITHIN THE LIMITS OF THE PAVED OR RUBBER AREA.
3. THE DIAMOND FROGS ARE NOT TO BE ANCHORED.
4. JOINTED RAIL ANCHORING PATTERN TO BE ADJUSTED FOR JOINT SPACING WHERE NECESSARY
5. JOINTED RAIL ANCHORING TO BE ADJUSTED FOR DIFFERING RAIL LENGTHS



JOINTED END OF CWR STRING

● INDICATES JOINT BARS

AT LOCATIONS WHERE CWR MEETS JOINTED RAIL, DO NOT APPLY ADDITIONAL ANCHORS TO JOINTED RAIL.

TYPICAL CONTINUOUS WELDED RAIL (CWR) STRING
(TANGENT & CURVATURE UP TO 3°)

RAIL ANCHORING PATTERNS FOR CONTINUOUS WELDED RAIL

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 1232

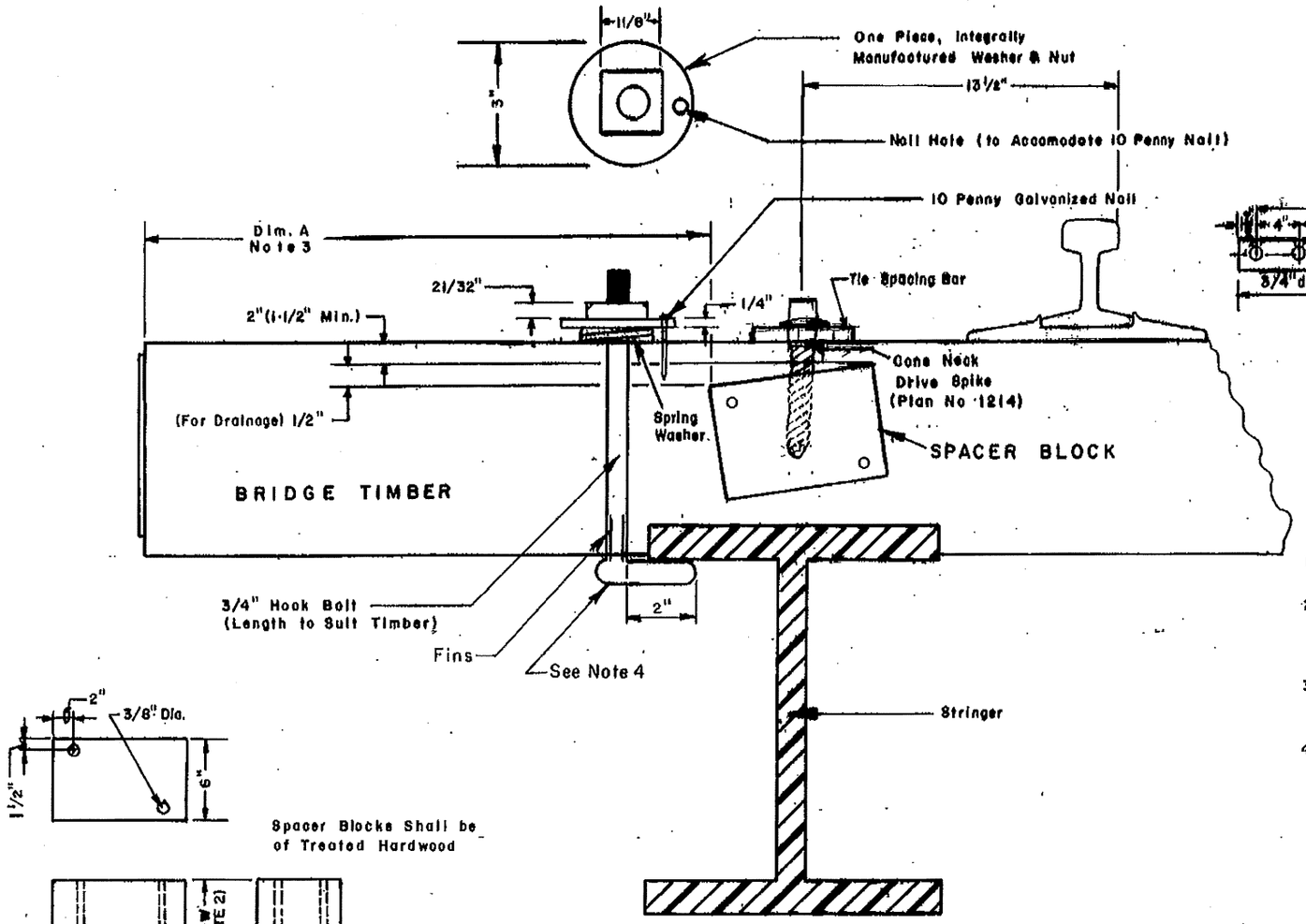
Oct. 28, 1992 (1)

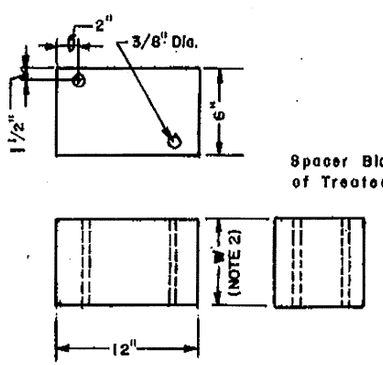
ISSUE DATE ISSUE NO.

RAIL ANCHORING DETAILS - JOINTED AND CWR TRACK

John D. Ray
ENGINEERING OFFICER

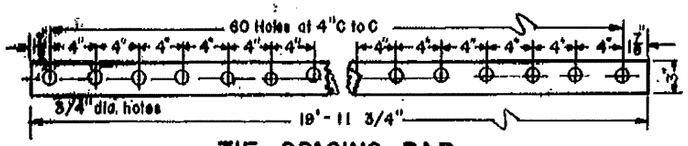
CHIEF ENGINEERING OFFICER





SPACER BLOCKS

DETAIL OF HOOK BOLTS USED AS BRIDGE TIMBER ANCHOR



TIE SPACING BAR

5/8" Thick x 3" Steel Bar

NOTES:

1. SEE MBTA'S MW-1 MANUAL FOR ADDITIONAL INFO.
2. WIDTH OF SPACER BLOCK (W) VARIES TO MEET TIMBER SPACING AND THICKNESS. PREFERRED SPACING IS 16" C-C USING 9" WIDE TIMBERS (W=7").
3. LOCATE SPACER BLOCKS AS CLOSE TO FIELD SIDE OF RUNNING RAIL AS POSSIBLE.
4. USE "HOOK BOLT PLATE" WHERE COVER PLATE OR STEEL FLANGES ARE TOO THICK TO ALLOW THE FINS TO HOLD THE BRIDGE TIES.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 1236

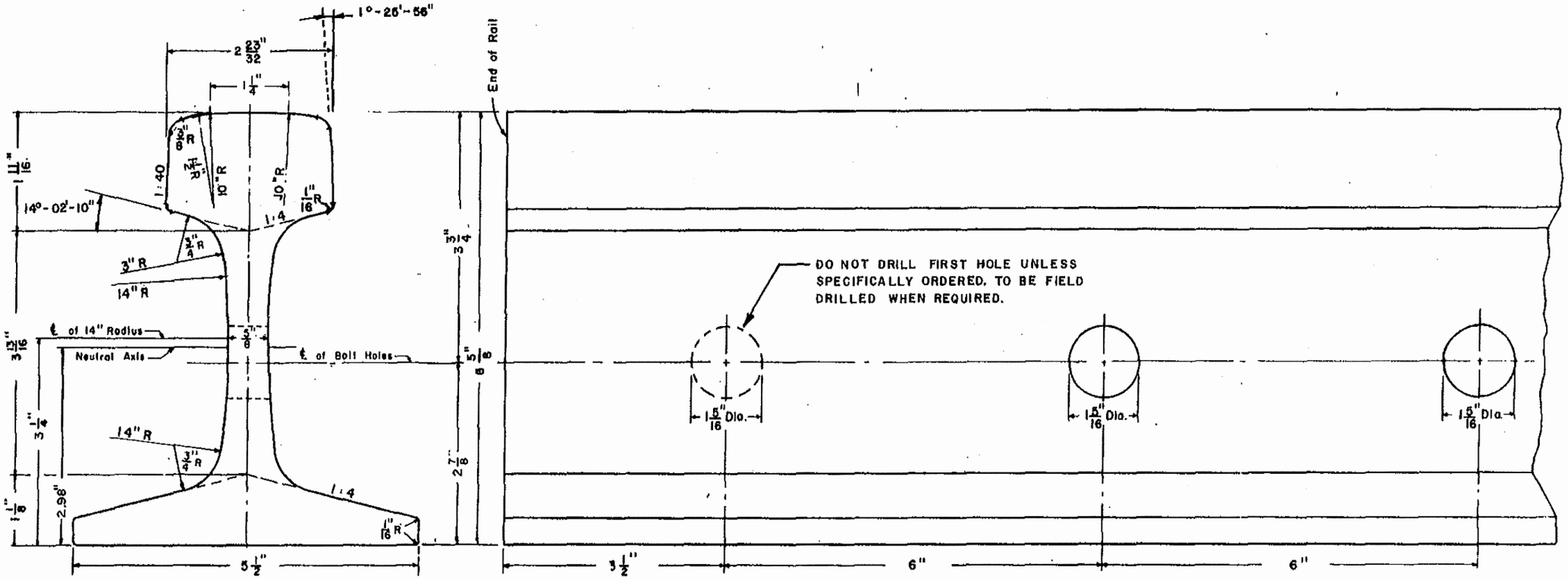
Jan. 5, 1996 (2)

ISSUE DATE ISSUE NO.

BRIDGE TIMBER ANCHORING DETAIL

John D. Ray

SECTION CHIEF



SECTION

DRILLING

Rails shall be in accordance with current A.R.E.A "Specifications for Steel Rails," except all rails within special trackwork shall be fully heat treated

MINIMUM MATHEMATICAL ATTRIBUTES

	Area Sq. In.	Percent
Head	3.91	34.8
Web	3.04	27.1
Base	4.29	38.1
Total	11.25	100.0

Moment of Inertia	65.6
Sec. Modulus of Head	18.0
Sec. Modulus of Base	22.0
Ratio M.I. to Area	5.83
Ratio Sec. Modulus Head to Area	1.60
Ratio Height to Base	1.20
Weight per Yard	114.7
Net Tons per Mile of Track	201.87

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

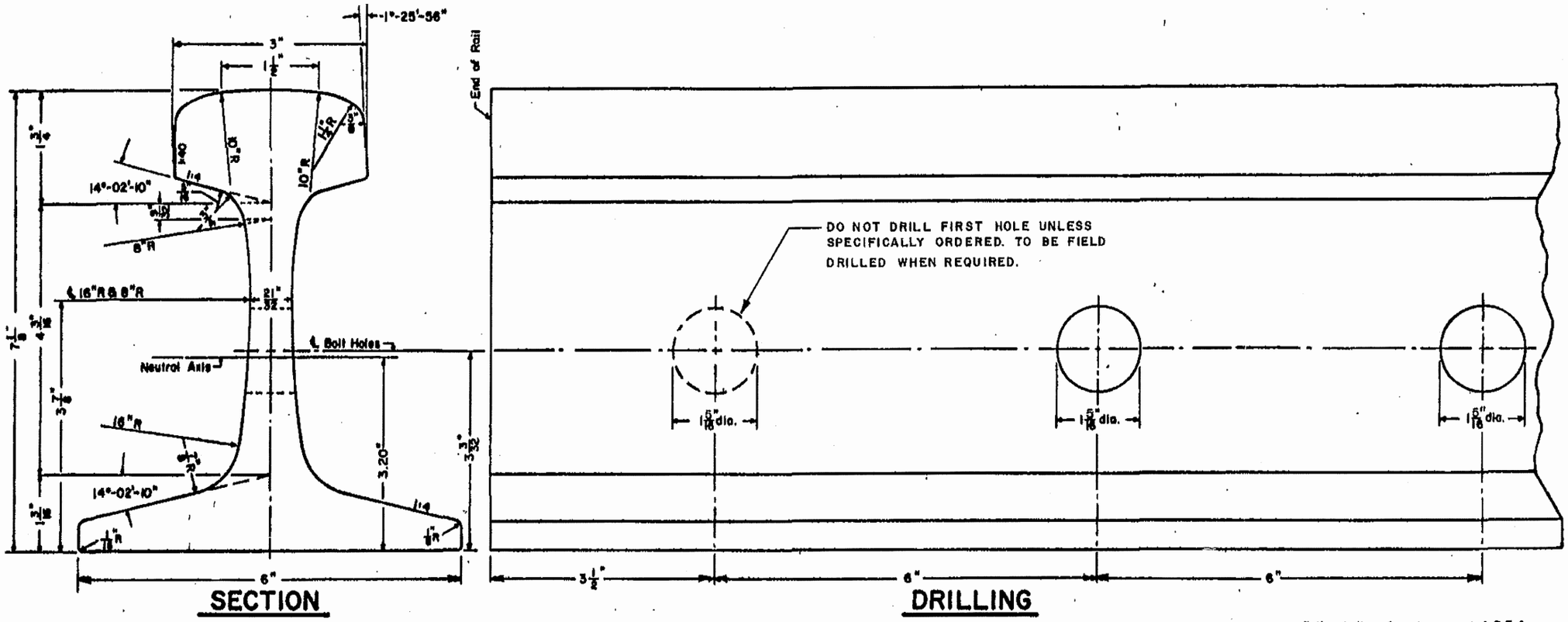
DWG. NO. 1300

Oct. 28, 1992 (2)
ISSUE DATE ISSUE NO.

115 LB R E RAIL

John D. Kay
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



MINIMUM MATHEMATICAL ATTRIBUTES

	Area Sq. in.	Percent
Head	4.42	34.1
Web	3.66	28.3
Base	4.87	37.6
Total	12.95	100.0

Moment of Inertia	88.2
Section modulus, head	22.5
Section modulus, base	27.6
Ratio m.i. to area	6.81
Ratio s.m. head to area	1.74
Ratio height to base	1.19
Calculated weight, lbs. per yard	132.1
Net Tons per Mile of Track	232.50

Rails shall conform to current A.R.E.A. "Specification For Open Hearth Steel Rails," except all rails within special trackwork shall be fully heat treated.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 1302

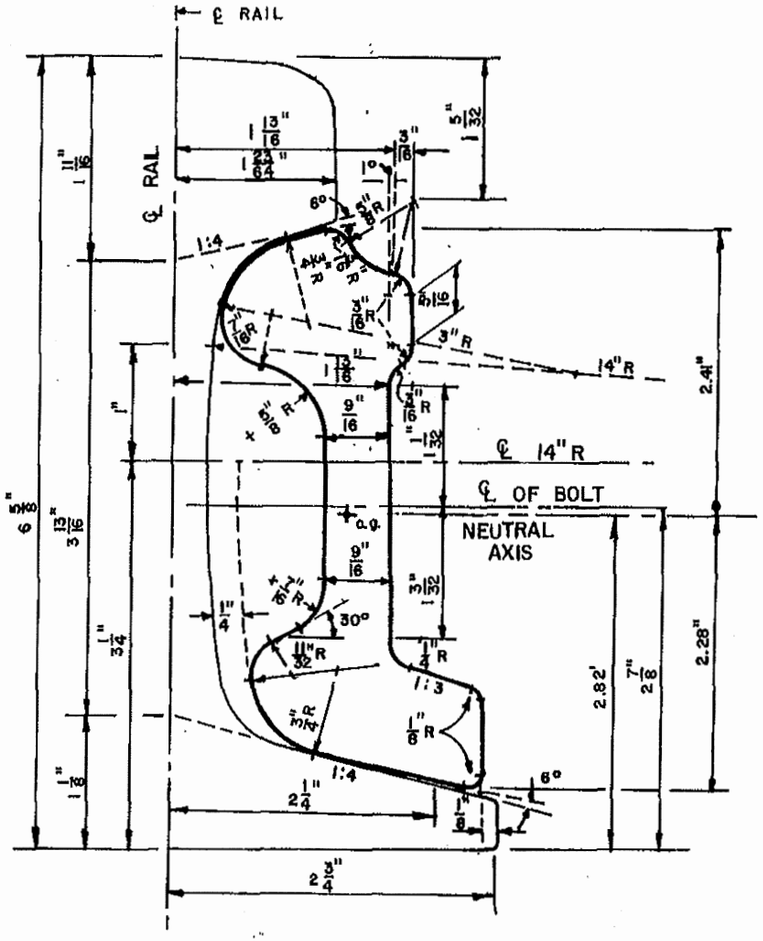
Oct. 28, 1992 (2)

ISSUE DATE ISSUE NO.

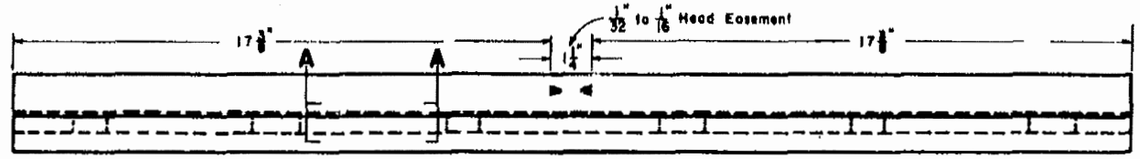
132 LB R E RAIL

John D. Ray — ENGINEERING OFFICER

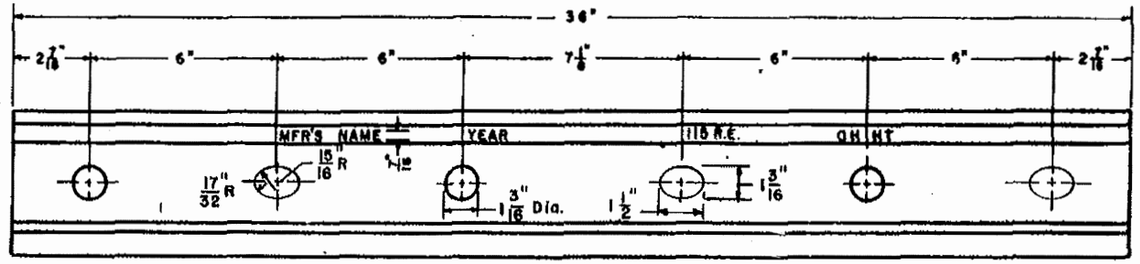
CHIEF ENGINEERING OFFICER



SECTION



PLAN



ELEVATION

MINIMUM MATHEMATICAL ATTRIBUTES (TWO BARS)

Moment of Inertia	20.6
Section Modulus above Neutral Axis	8.5
Section Modulus below Neutral Axis	9.0
Calculated Weight of 2 Bars	93.8 Lbs
Area in Square Inches (1 Bar)	4.70 sq. in.

1 1/8" Joint Bars shall be Short Toe and a Headfree Design, 1 1/8 Elliptical Neck Bolts. to be used with this bar.

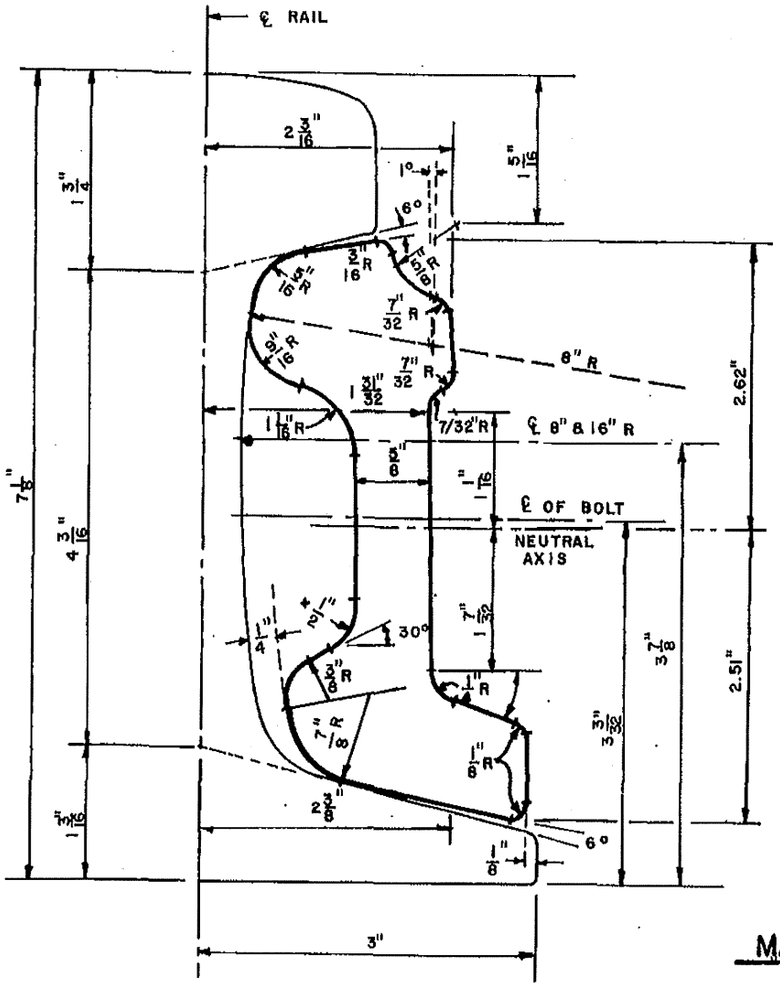
Joint Bars shall be in accordance with the current A.R.E.A "Specifications for Quenched Carbon Steel Joint Bars."

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY | RAILROAD OPERATIONS | DWG. NO. 1320 | Oct. 28, 1992 (2) ISSUE DATE ISSUE NO.

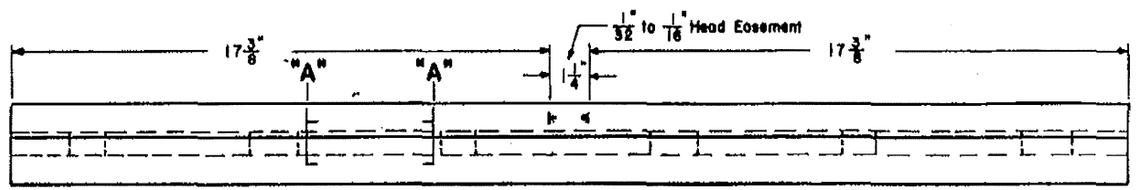
115 LB RE JOINT BAR

John D. Reay — ENGINEERING OFFICER

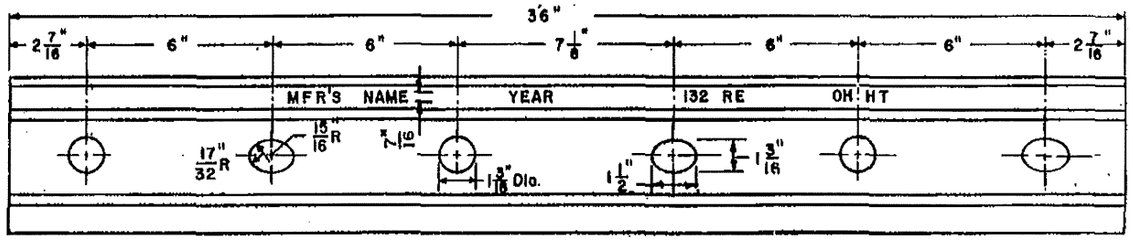
CHIEF ENGINEERING OFFICER



SECTION



PLAN



ELEVATION

MINIMUM MATHEMATICAL ATTRIBUTES

TWO BARS

Moment of Inertia	31.8
Section Modulus above Neutral Axis	13.2
Section Modulus below Neutral Axis	12.0
Calculated Weight of 2 Bars	117.71 Lbs.
Area in Square Inches (1 Bar)	5.52 sq. in.

Joint Bars shall be Short Toe and a Headfree Design.

Joint Bars shall be in accordance with the current A.R.E.A. "Specifications For Quenched Carbon Steel Joint Bars."

1 1/8" Elliptical Neck Bolts to be used with this bar.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 1322

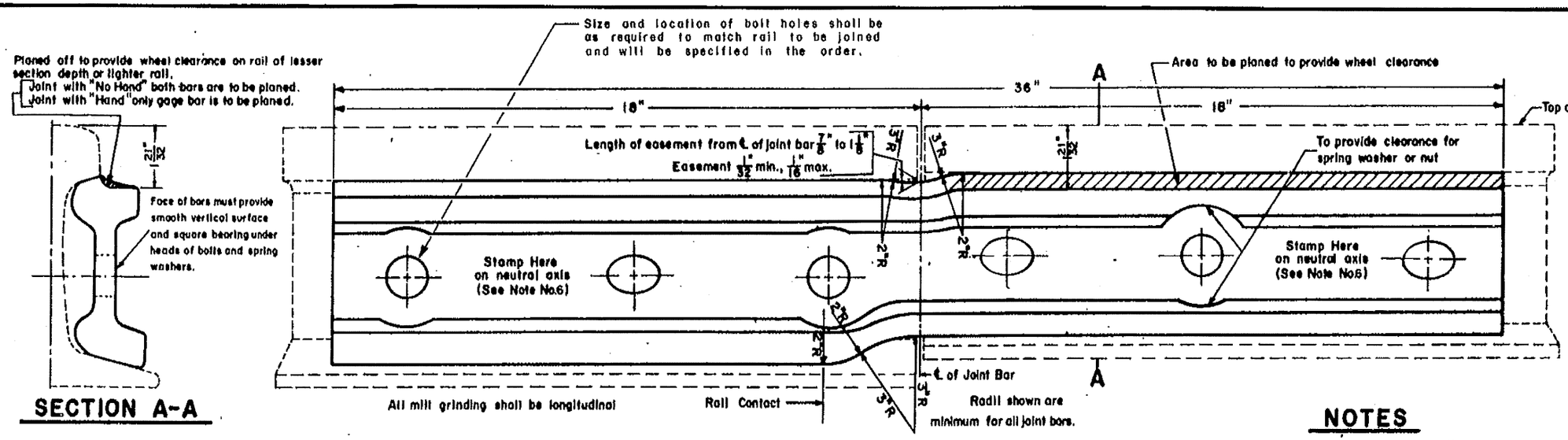
Oct. 28, 1992 (2)

ISSUE DATE ISSUE NO.

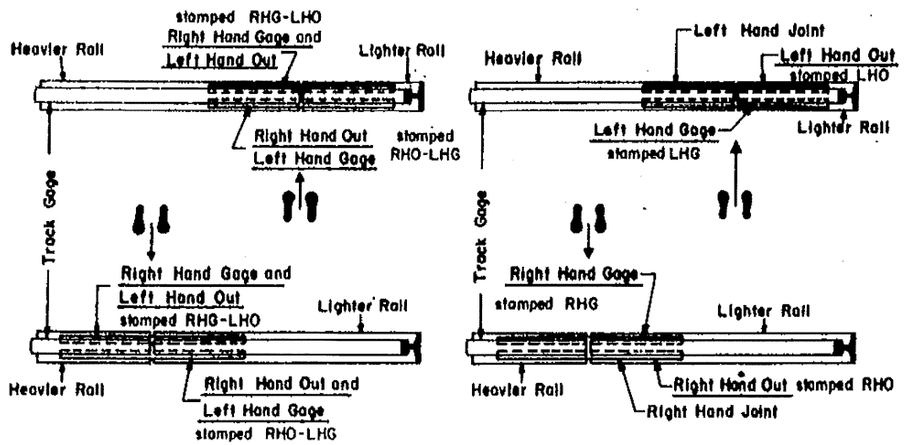
132 LB RE JOINT BAR

John P. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER


Planed off to provide wheel clearance on rail of lesser section depth or lighter rail.
Joint with "No Hand" both bars are to be planed.
Joint with "Hand" only gage bar is to be planed.
Face of bars must provide smooth vertical surface and square bearing under heads of bolts and spring washers.
Size and location of bolt holes shall be as required to match rail to be joined and will be specified in the order.
36"
18"
18"
A
A
Area to be planed to provide wheel clearance
Top of Rail
Length of easement from ℄ of joint bar 7/8" to 1 1/8"
Easement 1/32" min., 1/16" max.
To provide clearance for spring washer or nut
Stamp Here on neutral axis (See Note No.6)
Stamp Here on neutral axis (See Note No.6)
℄ of Joint Bar
All mill grinding shall be longitudinal
Rail Contact
Radii shown are minimum for all joint bars.

SECTION A-A



JOINTS – NO HAND

JOINTS – WITH A HAND

Proper designations for joint bars are shown underlined

TO DETERMINE HAND OF JOINT BAR

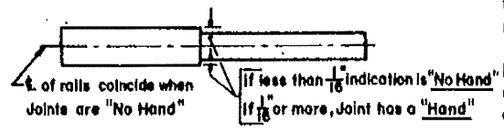
Stand between the rails (gage) of a track and face rails to be connected, *ORDER* —

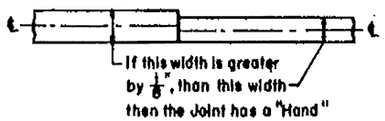
LEFT HAND JOINT – when the heavier rail is on your left.

RIGHT HAND JOINT – when the heavier rail is on your right.

ALLOWABLE COMPROMISES

100 - 85
107 - 85
107 - 100
112 - 100
112 - 107
115 - 100
115 - 107
115 - 112
132 - 115
136 - 115
136 - 132





Even though the width of the rail heads are equal or within the limits specified above, the indication is a "Hand" if one rail is vertical and one rail is canted.

NOTES

1. All joint bars shall conform to current AREA specifications for Quenched Carbon Steel Joint Bars.

2. One joint shall consist of two bars. The joint bars shall be furnished without any provisions for any wear in the rail.

3. Joint bars shall be ordered 36" long without exception unless specifically directed otherwise by the Chief Engineering Officer.

4. Joint bars shall be forged, heat treated and shaped to the configuration of standard joint bars of the respective rail sections to be joined.

5. All bars must be furnished so that the distance between other faces of the bars will be the same as for standard joint bar for the respective rail sections so joint bolts of standard lengths can be used.

6. All bars shall be stamped with depressed characters not less than ½" in height to show the manufacturer's name or trademark, year manufactured, and connecting rail sections at each end. Bars for joints that have "No Hand" shall be stamped "RHO-LHG" or "RHG-LHO" to indicate interchangeability. Bars for joints "With a Hand" shall be stamped "LHG", "RHG", "LHO", or "RHO", whichever applies, see sketch at left. All stamping shall be placed so as to not be covered by the bolt heads or the nuts.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

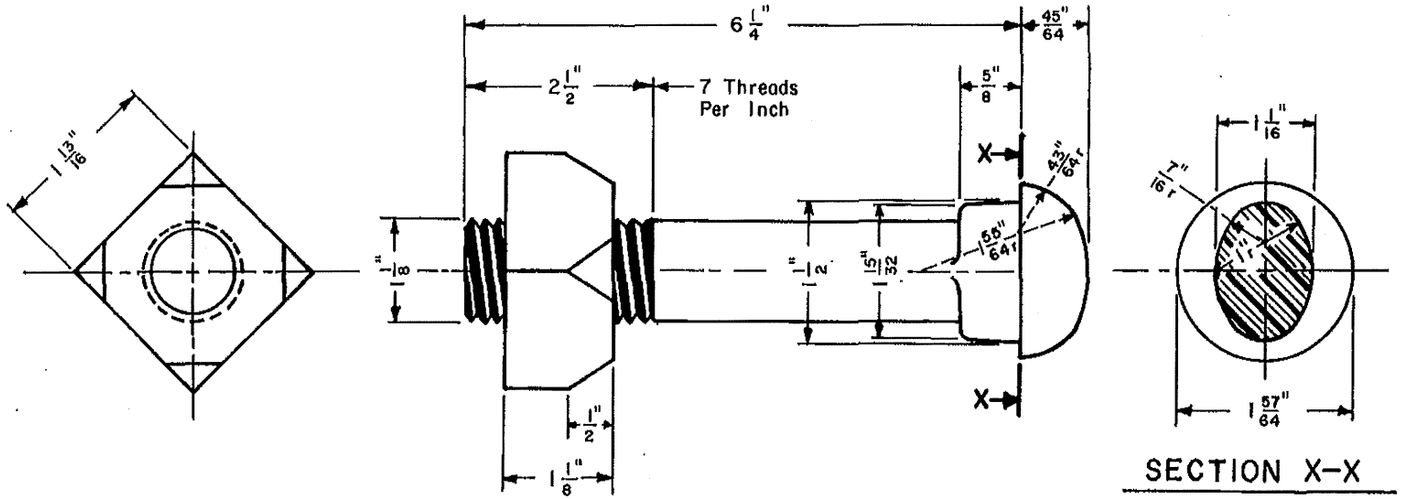
DWG. NO. 1328

Oct. 28, 1992 (2)
ISSUE DATE ISSUE NO.

COMPROMISE JOINT BARS FOR TEE RAIL

John D. Kay
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



NUT

1 1/8" TRACK BOLT
(ELIPTICAL NECK)

SECTION X-X

NOTES

1-All bolts, nuts and spring washers shall conform with current A.R.E.A. Specifications

2.-All threads to be rolled threads.

3-All nuts to be wrench fit

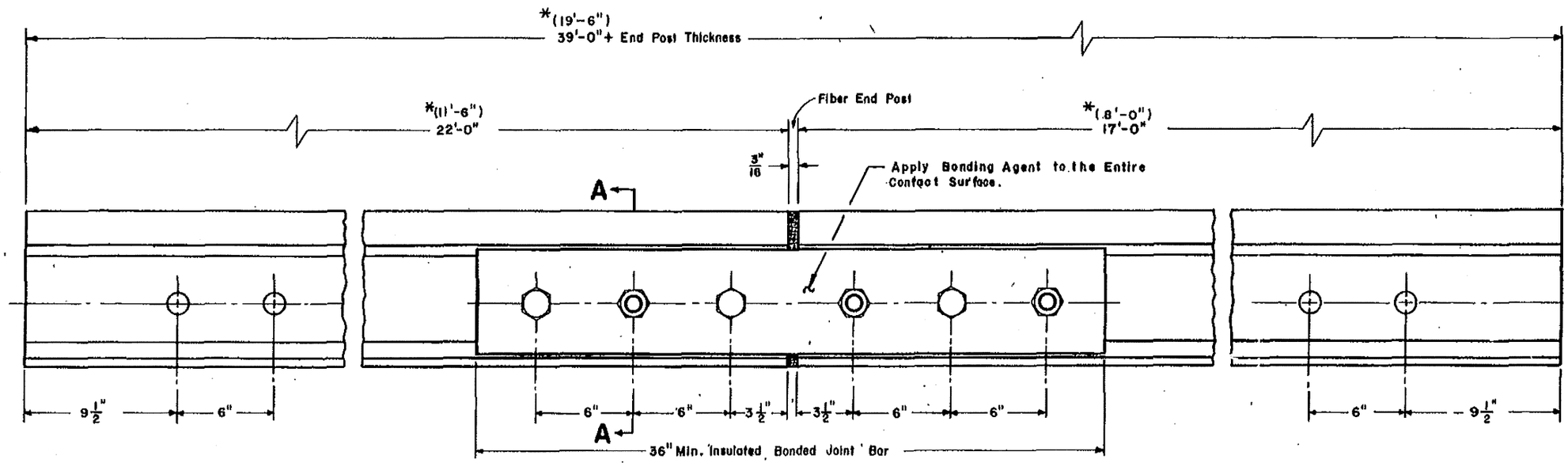
4-All bolts, nuts and spring washers to be thoroughly coated with a metal preservative.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1332
		Oct. 28, 1992 (ISSUE DATE) (1) (ISSUE NO.)

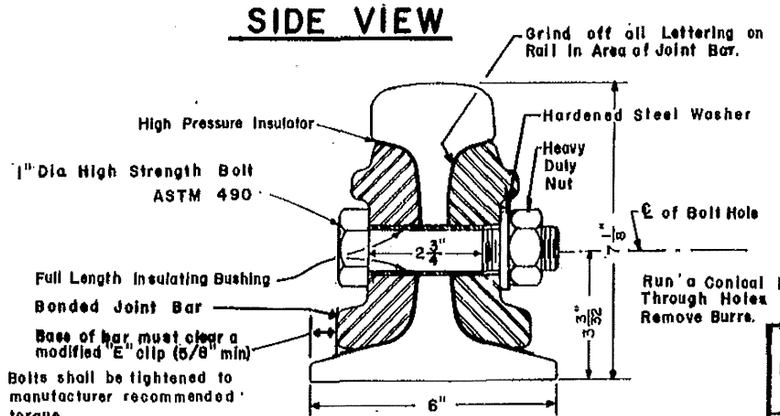
STANDARD TRACK BOLT

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



SIDE VIEW


Grind off all Lettering on Rail in Area of Joint Bar.
High Pressure Insulator
Hardened Steel Washer
1" Dia High Strength Bolt ASTM 490
Heavy Duty Nut
℄ of Bolt Hole
2 3/4"
Full Length Insulating Bushing
Bonded Joint Bar
Base of bar must clear a modified 'E' clip (5/8" min)
Run a Conical Reamer Through Holes to Remove Burrs.
3 3/32"
6"

Bolts shall be tightened to manufacturer recommended torque.

Allegheny..... 1050 ft. lbs
Portec..... 1050 " "

SECTION A-A

MINIMUM MATHEMATICAL ATTRIBUTES
Avg. Area - - - - - - - 6.40 sq. in.
Moment of Inertia - - - 12.40
Section Mod. - Top - - - 4.86
Section Mod. - Bottom - - 4.90

NOTES

1 - All rails to be Fully Heat Treated

2 - End bolt holes in the rail shall be 1-5/16" dia.

3 - Bolt heads to be installed in bar, in alternate positions.

* 4 - Supply 19'-6" long sections for new installations and 39'-0" long sections for replacements.

5 - When spiking joint, place head in reverse position.

6 - With Resilient Fastener Plates, use a Modified 'E' Clip, (2063A) - With Concrete Ties, include a modified 4263 Insulator.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

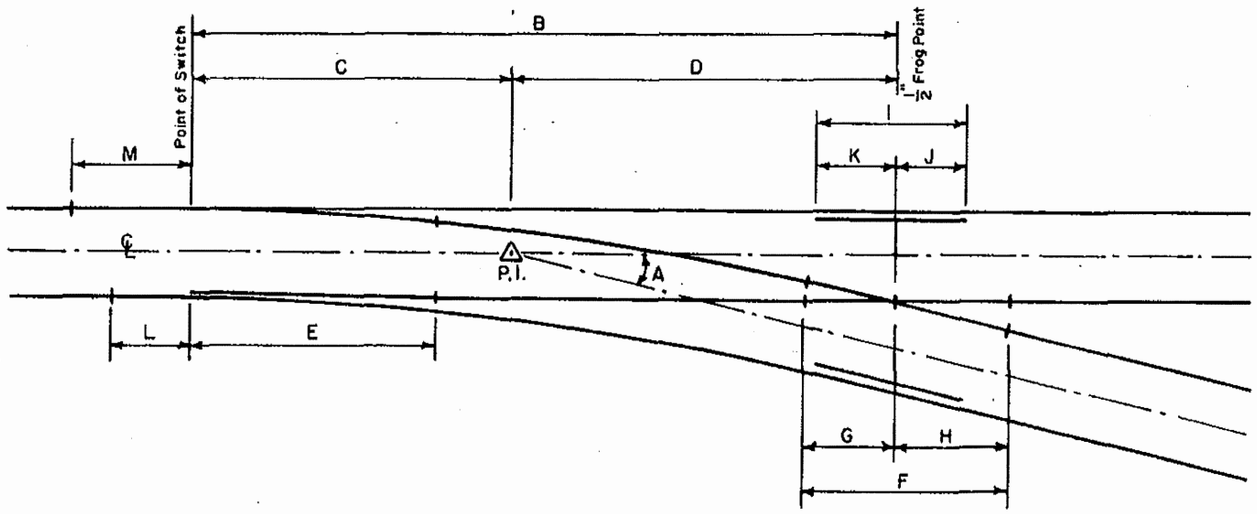
DWG. NO. 1340

Oct. 28, 1992 (2)
ISSUE DATE ISSUE NO.

132 R.E. BONDED INSULATED JOINT

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



A = Frog angle
B = Actual lead
C = Point of intersection to point of switch
D = Point of intersection to $\frac{1}{2}$" frog point
E = Length of straight switch point (② curved point)
F = Length of frog
G = Toe length
H = Heel length
I = Guard rail length
J = $\frac{1}{2}$" frog point to end of guard rail
K = $\frac{1}{2}$" frog point to end of guard rail
L = Point of switch to end of stock rail
M = Point of switch to end of stock rail

FROG DIMENSIONS SHOWN ARE FOR WELDED, RAIL-BOUND MANGANESE STEEL FROG.

TURNOUT NUMBER	ANGLE	DIMENSION													
	A	B	C	D	E	F	G	H	I	J	K	L	M	L	M
6①	9°-31'-38"	47'-6"	19'-0"	28'-6"	11'-0"	12'-6"	5'-1"	7'-5"	10'-0"	3'-8 1/2"	6'-3 1/2"	4'-6"	6'-2"	—	—
8	7°-09'-10"	68'-0"	30'-0"	38'-0"	16'-6"	18'-0"	7'-0"	11'-0"	10'-0"	3'-8 1/2"	6'-3 1/2"	4'-6"	6'-2"	—	—
10	5°-43'-29"	77'-4 3/4"	29'-10 3/4"	47'-6"	16'-6"	23'-0"	9'-8"	13'-6"	13'-3"	6'-3 1/2"	8'-11 1/2"	4'-6"	6'-2"	14'-7 1/2"	10'-5"
15	3°-49'-06"	111'-2 3/4"	39'-11 3/4"	71'-3"	②26'-0"	26'-8"	10'-4"	16'-4"	13'-3"	5'-4"	7'-11"	4'-6"	8'-0"	5'-0"	8'-9 1/4"
20	2°-51'-51"	154'-6 1/2"	59'-6 1/2"	95'-0"	②39'-0"	34'-2"	13'-1"	21'-1"	13'-3"	5'-4"	7'-11"	6'-4"	6'-4"	5'-7 1/2"	9'-0 1/2"
												SOLID HEEL BLOCK TURNOUTS		FLOATING HEEL BLOCK TURNOUTS	

① Requires special approval

②Curved Switch

STANDARD TURNOUTS

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

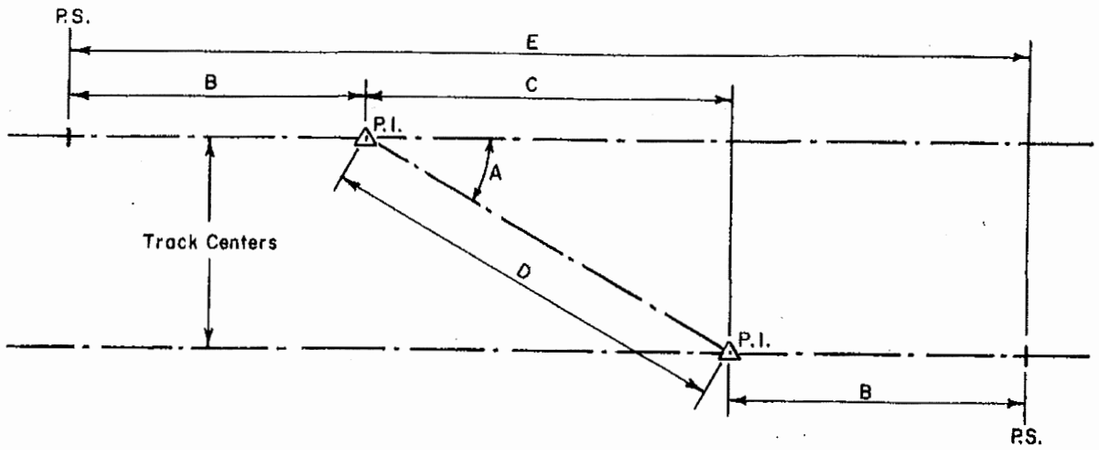
DWG. NO. 2000

Oct. 28, 1992 (2)
ISSUE DATE ISSUE NO

STANDARD TURNOUTS GENERAL LAYOUT

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



FOR TRACK CENTERS OTHER THAN SHOWN IN TABLE,

C = Track Centers ÷ Tangent Angle A
D = Track Centers ÷ Sine Angle A
E = Dimension C + 2B

FROG #	TANGENT	SINE
6	0.167831	0.165516
8	0.125492	0.124516
10	0.100254	0.099754
15	0.066741	0.066593
20	0.050031	0.049968

TRACK CENTERS MUST BE IN DECIMALS OF A FOOT.

TURNOUT NUMBER	ANGLE A	B	C Track Centers			D Track Centers			E Track Centers		
			12'-0"	13'-0"	14'-0"	12'-0"	13'-0"	14'-0"	12'-0"	13'-0"	14'-0"
6	9°-31'-38"	19'-0"	71'-6"	77'-5 1/2"	83'-5"	72'-6"	78'-6 1/2"	84'-7"	109'-6"	115'-5 1/2"	121'-5"
8	7°-09'-10"	30'-0"	95'-7 1/2"	103'-7 1/8"	111'-6 3/4"	96'-4 1/2"	104'-4 7/8"	112'-5 1/4"	155'-7 1/2"	163'-7 1/8"	171'-6 3/4"
10	5°-43'-29"	29'-10 3/4"	119'-8 7/16"	129'-8 1/8"	139'-7 13/16"	120'-3 5/8"	130'-3 15/16"	140'-4 1/4"	179'-5 15/16"	189'-5 5/8"	199'-5 5/16"
15	3°-49'-06"	39'-11 3/4"	179'-9 9/16"	194'-9 3/8"	209'-9 3/16"	180'-2 3/8"	195'-2 9/16"	210'-2 13/16"	259'-9 1/16"	274'-8 7/8"	289'-8 11/16"
20	2°-51'-51"	59'-6 1/2"	239'-10 1/16"	259'-10 1/16"	279'-9 15/16"	240'-1 13/16"	260'-2"	280'-2 1/8"	358'-11 1/4"	378'-11 1/16"	398'-10 15/16"

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2002

Oct. 28., 1992 (2)
ISSUE DATE ISSUE NO.

STANDARD CROSSOVERS GENERAL LAYOUT

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER

BILL OF MATERIAL FOR A NO. 8 TURNOUT

QUANTITY	DESCRIPTION	REFERENCE PLAN NO.
1*	PAIR 16'-6" SWITCH POINTS COMPLETE WITH REINFORCING BARS, CLIPS AND STOPS ATTACHED.	2104
2	HEEL BLOCK ASSEMBLIES, COMPLETE	2350
2*	39'-0" UNDERCUT STOCK RAILS	2104
1	INSULATED GAGE PLATE (NO. 16)	2106
2	NO. 0 ADJUSTABLE BRACE SLIDE PLATES	2106
2	NO. 1A ADJUSTABLE BRACE SLIDE PLATES	2106
4	NO. 1 ADJUSTABLE BRACE SLIDE PLATES	2106
2	NO. 2 ADJUSTABLE BRACE SLIDE PLATES	2106
6	NO. 1-P SHOULDER SLIDE PLATES	2106
2	NO. 3 SHOULDER SLIDE PLATES	2106
2	NO. S11 HEEL PLATES, 1-RH AND 1-LH	2106
2	SWITCH RAIL STOPS	2350
4	ADJUSTABLE ROCKER CLIPS FOR VERTICAL SWITCH RODS	2107
2	INSULATED VERTICAL SWITCH RODS (NO. 1 & 2)	2107
20	TURNOUT PLATES FOR USE BEHIND HEEL OF SWITCH (NO. 8-2 TO 8-11 X 2)	2340
12	RESILIENTLY FASTENED ADJUSTABLE RAIL BRACE	2352
1	NO. 8 RAILBOUND MANGANESE STEEL FROG, COMPLETE	2084
8	NO. P27 SELF ALIGNING SHOULDER TIE PLATE	2328
10	NO. P31 SELF ALIGNING SHOULDER TIE PLATE	2328
2	NO. P35 SELF ALIGNING SHOULDER TIE PLATE	2328
4	NO. PR27 SELF ALIGNING SHOULDER TIE PLATE	2328
2	NO. PR31 SELF ALIGNING SHOULDER TIE PLATE	2328

* THESE ITEMS SHALL BE SUPPLIED FOR R.H., L.H. OR EQUILATERAL TURNOUT, AS REQUIRED

QUANTITY	DESCRIPTION	REFERENCE PLAN NO.
2	10'-0" MANGANESE STEEL ONE PIECE GUARD RAILS	2300
2	BOLTED, POLY TYPE INSULATED JOINT ASSEMBLY	-
-	19'-6" BONDED INSULATED JOINT PLUG RAIL	1340
2	39'-0" LENGTHS OF FULLY HEAT TREATED RAIL	-
1 EA.	VARIOUS LENGTHS OF FULLY, HEAT TREATED RAIL AS FOLLOWS: 25'-0", 25'-0" 24'-5⅛", 23'-5⅛", 21'-3", 20'-0", 19'-6", 19'-6"	-
920	7" LOCK SPIKES	1216
100	⅝" x 6" A.R.E.A. SPIKES**	1210
360	RESILIENT FASTENER SPRING CLIPS - TYPE "E"	-
16	RESILIENT FASTENER SPRING CLIPS - TYPE MODIFIED "E"	-
124	STANDARD RESILIENT FASTENER TIE PLATES	1224
14	1:80 CANT TRANSITION TIE PLATES	2348
-	PAIRS OF MODIFIED JOINT BAR ASSEMBLIES (HEAD & TOE OF GAGE SIDE BARS REMOVED TO ALLOW SWITCH MOVEMENT AT JOINT NEAR HEEL OF SWITCH-NO. 20 ONLY)	2202
14	STANDARD JOINT BAR ASSEMBLIES	1322 OR 1320
56	STANDARD TRACK BOLTS WITH NUTS AND WASHERS	1332

** CUT SPIKES ARE FURNISHED BY THE INSTALLER
• WELD KITS (14) TO BE FURNISHED BY THE INSTALLER

NOTES:

1. TURNOUTS SUPPLIED SHALL BE EITHER 115 OR 132 LB. RE AS SPECIFIED IN THE ORDER.
2. TURNOUTS SHALL BE RESILIENTLY FASTENED THROUGHOUT, EXCEPT FROG TIE PLATES, GUARD RAILS AND LOCATIONS WHERE SPRING CLIPS CANNOT BE PHYSICALLY INSTALLED SUCH AS ON TURNOUT PLATES NEAR HEEL.
3. FABRICATOR SHALL SUPPLY ALL MATERIAL REQUIRED FOR THE COMPLETE INSTALLATION OF THE TURNOUT EXCEPT SWITCH TIMBER UNLESS OTHERWISE SPECIFIED IN THE ORDER.
4. FOR SWITCH TIMBER SCHEDULE, SEE PLAN 2082.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

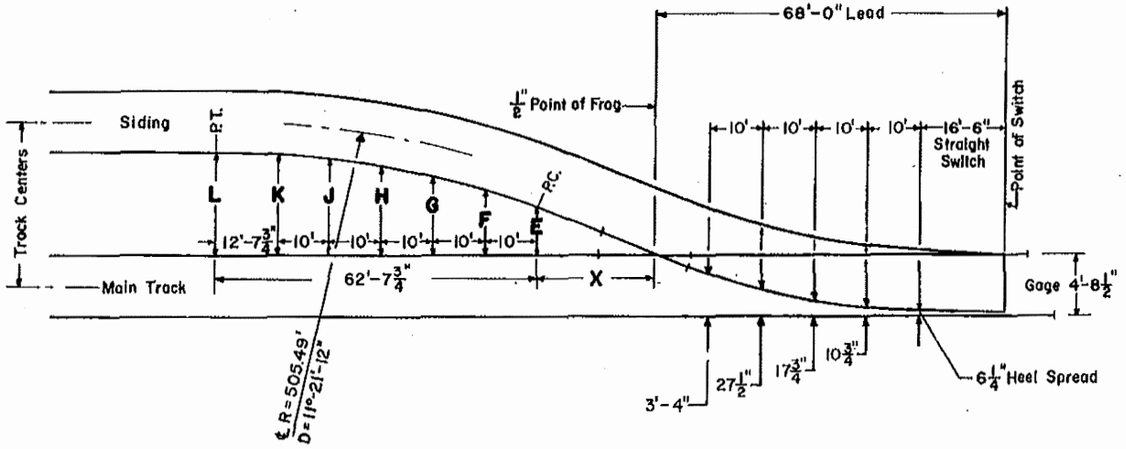
RAILROAD OPERATIONS

DWG. NO. 2080

JAN. 5, 1996 (ISSUE DATE) (3) (ISSUE NO.)

NO. 8 TURNOUT
BILL OF MATERIAL

John D. Ray
SECTION CHIEF



TURNOUT DATA

FROG - No. 8 Angle 7°-09'-10"

FROG DIMENSIONS

RAIL SECTION	FROG TYPE	LENGTH		
		TOE	HEEL	TOTAL
115, 132	RBM	7'-0"	11'-0"	18'-0"
115, 132	S.G.	2'-11"	6-0"	8'-11"

SWITCH RAILS

Length — 16'-6"
Type — Straight
Switch Angle For Samson Switch Points — 1°-48'-32"
Heel Block Angle — Same As Switch Angle
Point of Switch to P.C. — 19'-4½"

LEAD

Point of Switch to ½" Point of Frog — 68'-0"
℄ Radius — 446.162'
Degree of Curve — 12°-52'-08"

CLOSURE RAIL DIMENSIONS

RAIL SECTION	FROG TYPE	LENGTH OF CLOSURE RAILS	
		CURVED	STRAIGHT
115, 132	RBM	44'-8 11/16"	44'-8"
115, 132	S.G.	46'-9 11/16"	48'-7"

OFFSETS BEHIND THE HEEL OF FROG

TRACK CENTERS	X	E	F	G	H	J	K	L
12'-2"	27'-10¾"	3'-6½"	4'-8⅜"	5'-7¾"	6'-4¾"	6'-11⅜"	7'-3⅝"	7'-5½"
12'-4"	29'-2½"	3'-8½"	4'-10⅜"	5'-9¾"	6'-6¾"	7'-1⅜"	7'-5⅝"	7'-7½"
12'-6"	30'-6½"	3'-10½"	5'-0⅜"	5'-11¾"	6'-8¾"	7'-3⅜"	7'-7⅝"	7'-9½"
12'-8"	31'-10½"	4'-0½"	5'-2⅜"	6'-1¾"	6'-10¾"	7'-5⅜"	7'-9⅝"	7'-11½"
12'-10"	33'-2⅜"	4'-2½"	5'-4⅜"	6'-3¾"	7'-0⅝"	7'-7⅜"	7'-11⅝"	8'-1½"
13'-0"	34'-6⅝"	4'-4½"	5'-6⅜"	6'-5⅝"	7'-2¾"	7'-9⅜"	8'-1⅝"	8'-3½"
13'-2"	35'-10¼"	4'-6½"	5'-8⅜"	6'-7⅝"	7'-4⅝"	7'-11⅜"	8'-3⅝"	8'-5½"
13'-4"	37'-2¼"	4'-8½"	5'-8⅜"	6'-9⅝"	7'-6¾"	8'-1⅜"	8'-5⅝"	8'-7½"
13'-6"	38'-6⅛"	4'-10½"	5'-10⅜"	6'-11⅜"	7'-8⅝"	8'-3⅜"	8'-7⅝"	8'-9½"

Values for track centers not shown may be determined by interpolation.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2081

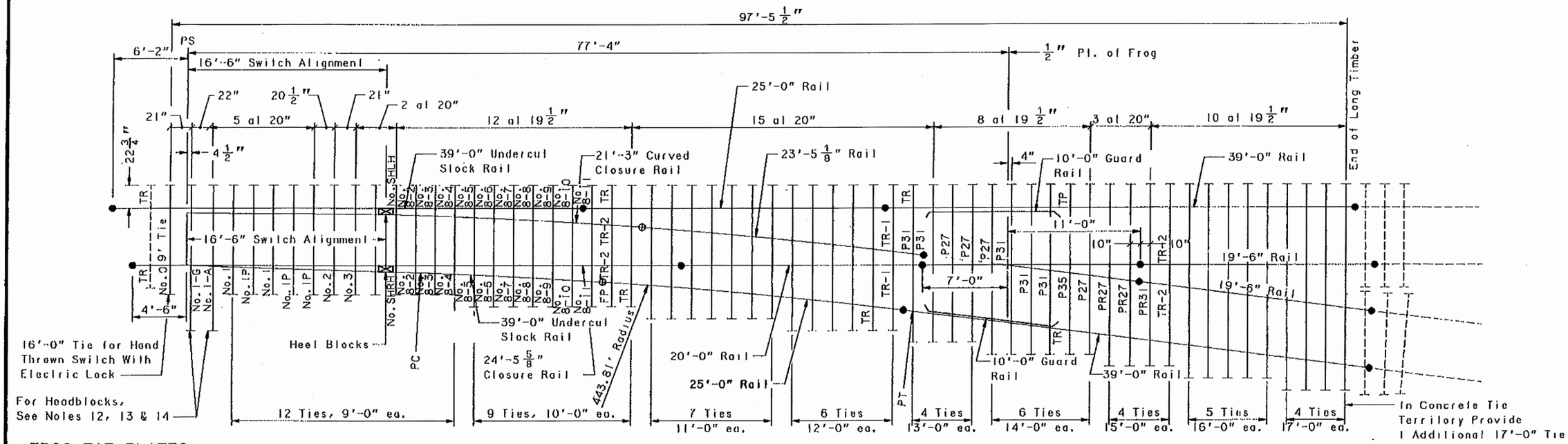
Nov. 17, 1986 (1)
ISSUE DATE ISSUE NO.

OFFSETS FOR NO. 8 TURNOUT

115 OR 132 R.E. RAIL-UNDERCUT

ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



FROG TIE PLATES

8- P27 SAS (Self-Aligning Shoulder)
10 - P31 SAS
2 - P35 SAS
4 - PR27 SAS
2 - PR31 SAS

NOTES

1-Stock rails and switch points and all rails furnished to be fully heat treated.
2-Switch Points per A.R.E.A. Detail 5100 as shown on Plan 2104.
3-39' stock rails, to be undercut as per Plan 2104.
4-For switch details see Plan 2104.
5-Gage plate No. 1 - G as per Plan 2106.
6-Switch plates Nos. 0, 1, 1A, 1P and 1P as per Plan 2106.
7-Turnout plates, No. 2 thru No. 12, as per Plan 2340.
8-Vertical insulated switch rods and adjustable rocker clips, as per Plan 2107.
9-Heel block as per Plan 2350.
10-All rails to be drilled as shown on this plan, except that first hole is not to be drilled by the manufacturer. Installer to field drill first hole when necessary.
11-All tie plates to be resiliently fastened except guard rails.
12-Two 9"x10"x13' Headblocks needed with switch stand 3' high or less, 16' long with stands over 3'.
13-Three 9"x10"x16' Headblocks needed for hand thrown switch with electric lock.
14-Two 9"x10"x12' Headblocks needed for power operated switch.
15-See Plan 2080 for Bill of Material.
16-Rail lengths are computed to allow a 1/8" gap for temporarily bolting the field joints and 3/16" gap for insulated joints. When rails are welded in the field, they must be cut to provide gaps recommended by the weld kit manufacturer.
17-Transition Plates (TR) 1:80 Cant, as per Plan 2348.

LEGEND

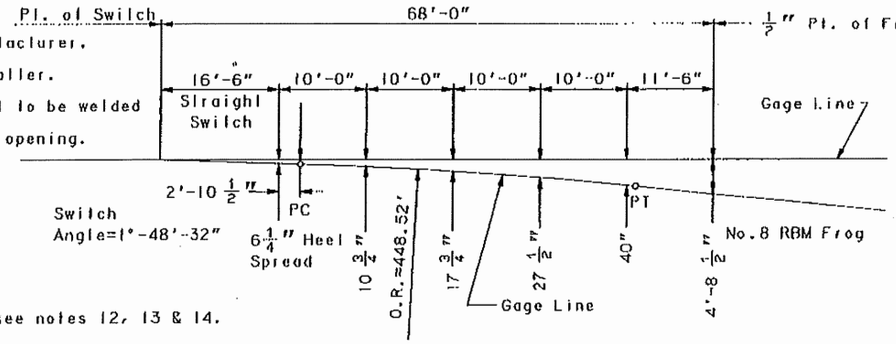
Indicates rails furnished by the manufacturer.
Indicates rails furnished by the Installer.
Indicates joints at heel of switch-not to be welded
Indicates insulated joints with 3/16" opening.
Indicates joints to be field welded.

LONG TIMBERS REQUIRED

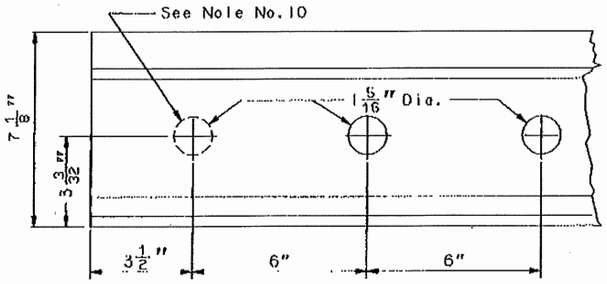
Quantity	Length
13*	9'-0"
9	10'-0"
7	11'-0"
6	12'-0"
4	13'-0"
6	14'-0"
4	15'-0"
5	16'-0"
4**	17'-0"
58	Total

+57 w. electric lock

-Headblocks not shown in table, see notes 12, 13 & 14.
* 12 with electric lock
** 5, 17'-0" ties in concrete tie territory



OFFSETS FOR NO.8 R.H. TURNOUT



RAIL END DRILLING

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

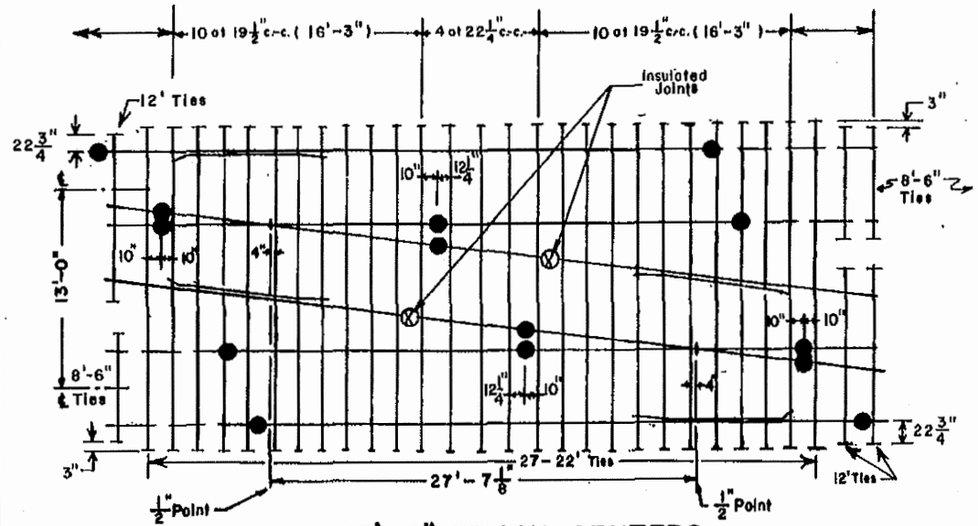
DWG. NO. 2082

JAN. 5, 1996 ISSUE DATE

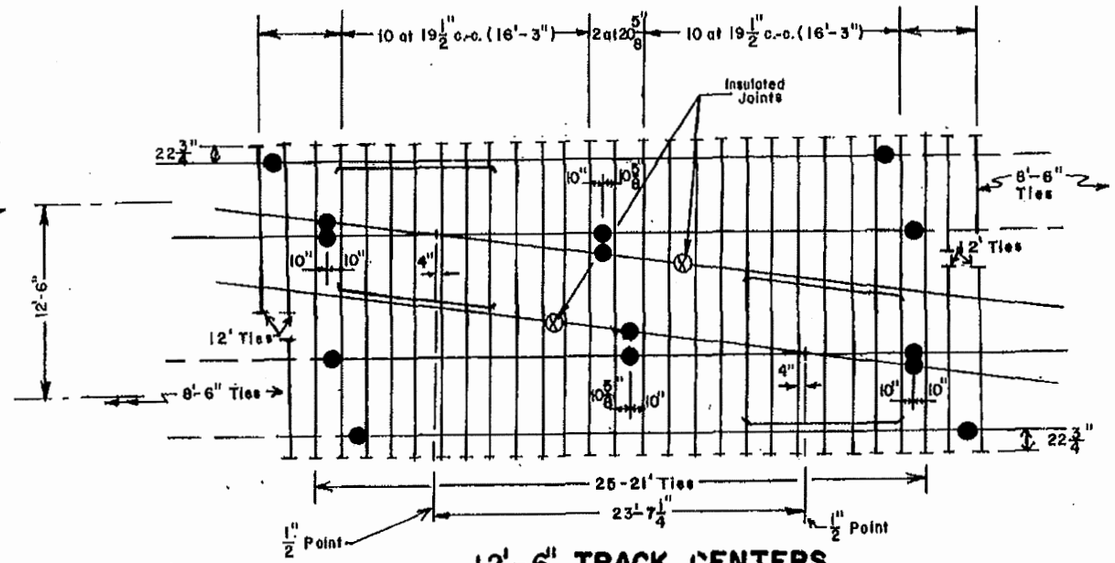
(3) ISSUE NO.

NO. 8 WELDED TURNOUT TIE & RAIL LAYOUT

John D. Ray
SECTION CHIEF

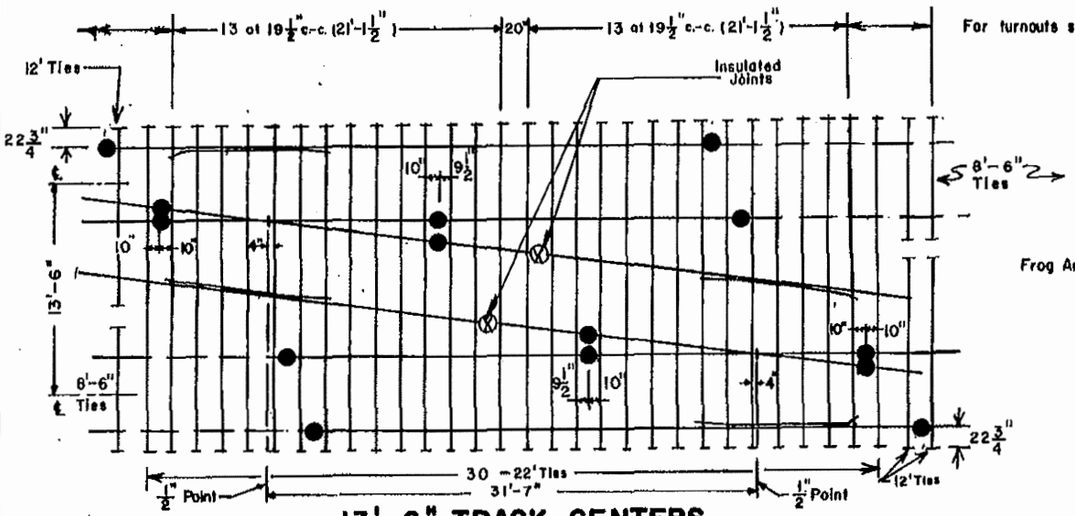


13'-0" TRACK CENTERS



12'-6" TRACK CENTERS

For every 1" change in track centers, the horizontal distance between ½" frog points will change 8" (approx.)



13'-6" TRACK CENTERS

For turnouts see Plan No. 2082.

Frog Angle = 7°-09'-10"

SWITCH TIMBER FOR A CROSSOVER

TRACK CENTERS	TIMBER LENGTHS						
	9'-0"	10'-0"	11'-0"	12'-0"	13'-0"	21'-0"	22'-0"
12'-6"	26 *	18	14	12	—	25	—
13'-0"	26 *	18	14	12	—	—	27
13'-6"	26 *	18	14	12	—	—	30

FOR HEADBLOCKS, ADD THE FOLLOWING 9"x10" TIMBERS:
Handthrown Switch – 4 - 13'-0" with switchstand less than 3' high, 4 - 16'-0" w/3'+
*Handthrown Switch with Electric Locking - 6 - 16'-0" and delete 2 - 9'-0" from Table.
Power Operated Switch - 4 - 12'-0"

NOTE: Timber layout shown is for exact track centers indicated. Other track centers require adjusting the timber schedule and timber spacing as required. All timber must extend a minimum of 18" from field side base of rail.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

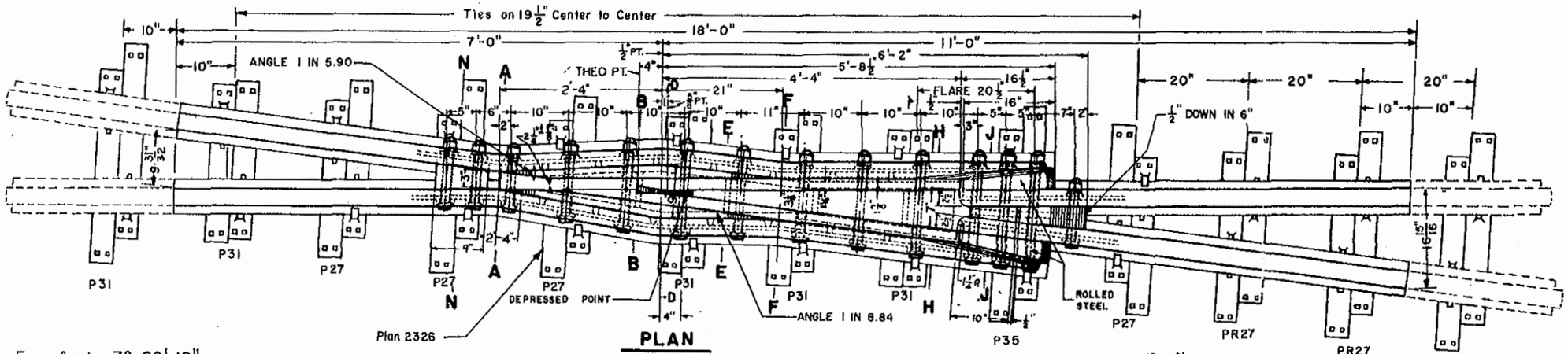
DWG. NO. 2083

Oct. 28, 1992 (2)
ISSUE DATE ISSUE NO.

NO. 8 CROSSOVER TIE AND RAIL LAYOUT

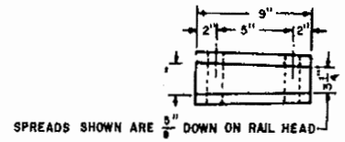
John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER

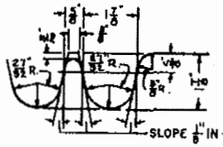


PLAN

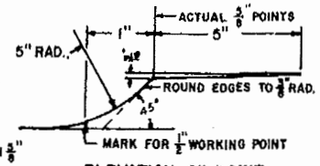
Frog Angle = 7°-09'-10"



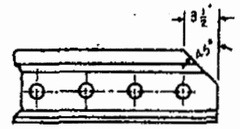
TOE FILLER BLOCK



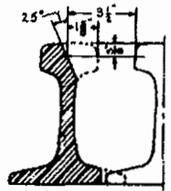
SECTION AT POINT



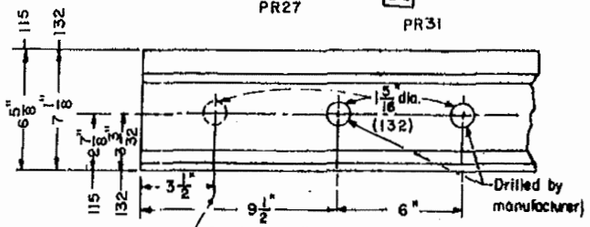
ELEVATION OF POINT

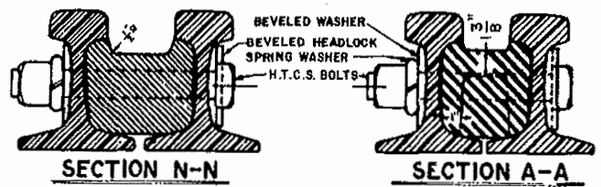


BEVELED END WING RAIL



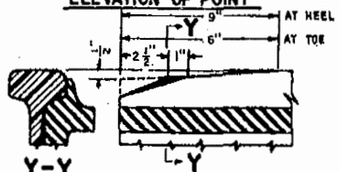
PLANING AT END OF WING RAIL



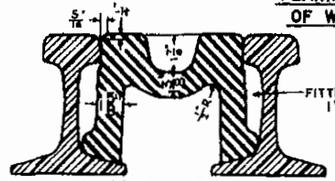


SECTION N-N

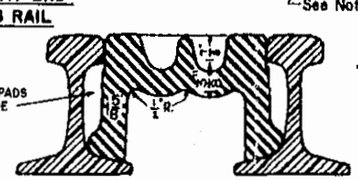
SECTION A-A



TYPICAL LONGITUDINAL SECTION AT TOE AND HEEL END OF MANGANESE



SECTION B-B



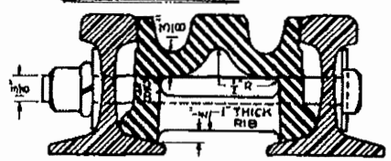
SECTION D-D

RAIL END DRILLING

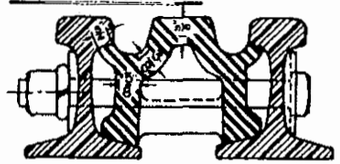
FROG TIE PLATES REQ.

8 - P27
10 - P31
2 - P35
4 - PR27
2 - PR31

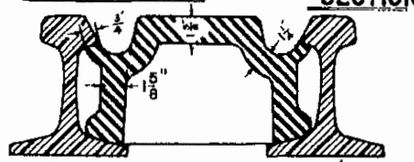
Note: For bolt lengths and quantities, see drawing No. 2502.



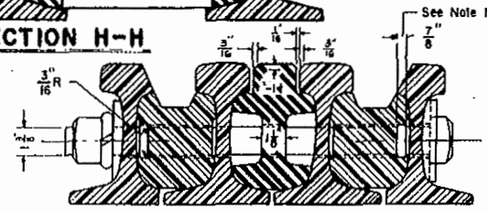
SECTION E-E



SECTION F-F



SECTION H-H



SECTION J-J

NOTES

1 This plan is for use with A.R.E.A. recommended standards for 115 or 132 R.E. Rail
2 - Workmanship and materials, including beveling and hardening rail ends, shall be per current "A.R.E.A. Specifications" for heavy wall section frogs.
3 - Groove for bond wires shall extend from end of filler block at least to the center line of second bolt hole.
4 - All bolts used in construction of frog, shall be dipped immediately before applying (so that all threads are thoroughly coated) in grease.
5 - When frog is to be used in bolted track, first bolt hole to be drilled in the field by installer as shown on this plan.
6 - Casting to be explosion hardened, with toe and heel arms to be fully heat treated rail.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2084

Jan. 5, 1996 (3)
ISSUE DATE ISSUE NO

No. 8 RAILBOUND MANGANESE STEEL FROG

FOR 115 LB. OR 132 LB. R.E. RAIL

John D. Ray
SECTION CHIEF

BILL OF MATERIAL FOR A NO. 10 TURNOUT

Quantity	Description	Reference Plan No.
* 1	Pair of 16'-6" Switch Points, complete with reinforcing bars, clips and stops attached	2104
2	Heel Block Assemblies, complete	2350
* 2	39'-0" Undercut Stock Rails	2104
1	Insulated Gage Plates (Nos. 1-G)	2106
2	No.0 Adjustable Brace Slide Plates	2106
2	No.1A Adjustable Brace Slide Plates	2106
4	No.1 Adjustable Brace Slide Plates	2106
2	No. 2 Adjustable Brace Slide Plates	2106
6	No.1-P Shoulder Slide Plates	2106
2	No. 3 Shoulder Slide Plates	2106
2	No. SH Heel Plates, 1-RH and 1-LH	2106
2	Switch Rail Stops	2350
4	Adjustable Rocker Clips for Vertical Switch Rods	2107
2	Insulated Vertical Switch Rods (No. 1 & 2)	2107
22	Turnout Plates for use behind heel of switch (No. 10-2 to 10-12 x2)	2340
12	Resiliently Fastened Adjustable Rail Brace	2352
1	No. 10 Railbound Manganese Steel Frog, Complete	2105
4	FT20 Hook Twin Tie Plates	2326
6	FT23 " " " "	"
10	FT27 " " " "	"
2	FT29 " " " "	"
–	FT23 Modified Hook Twin Tie Plates	"
2	FT27 " " " " "	"
2	FT29 " " " " "	"
–	FT33 " " " " "	"
–	FTR27 Hook Twin Tie Plates	"
2	FTR29 " " " "	"
–	FTR31 " " " "	"
–	FTR33 " " " "	"
–	FTR27 Modified Hook Twin Tie Plates	"
–	FTR29 " " " " "	"
2	FTR31 " " " " "	"

* These items shall be supplied for R.H., L.H. or Equilateral Turnout as required.

Quantity	Description	Reference Plan No.
2	FTR33 Modified Hook Twin Tie Plates	2326
2	13'-3" Manganese Steel One Piece Guard Rails	2302
2	Bolted, Poly Type Insulated Joint Assembly	–
–	19'-6" Bonded Insulated Joint Plug Rail	1340
2	39'-0" Lengths of Fully Heat Treated Rail	–
1 ea.	Various Lengths of Fully Heat Treated Rail as follows: 23'-6", 23'-6" 16'-3 1/8", 26'-0", 25'-4 3/8", 23'-0", 21'-4", 33'-0", 13'-11", 19'-6"	–
1065	7" Lock Spikes	1216
100	5/8" x 6" AREA Spikes **	1210
450	Resilient Fastener Spring Clips - Type "E"	–
16	Resilient Fastener Spring Clips - Type Modified "E"	–
175	Standard Resilient Fastener Tie Plates	1224
–	Pairs of Modified Joint Bar Assemblies (Head & Toe of Gage Side Bars Removed to Allow Switch Movement at Joint near Heel of Switch - No.20 only)	2202
16	Standard Joint Bar Assemblies	1322 or 1320
64	Standard Track Bolts with Nuts and Washers	1332

** Cut Spikes are furnished by the Installer.

• Weld Kits (16) to be furnished by the Installer.

Notes:

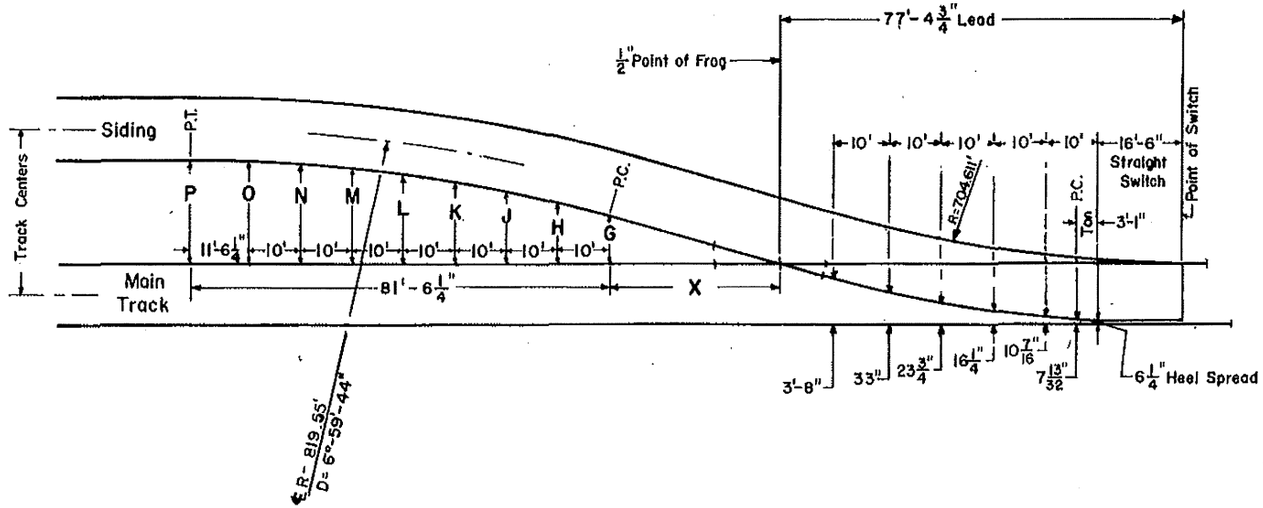
1. Turnouts supplied shall be either 115 or 132 LB. RE as specified in the order.
2. Turnouts shall be resiliently fastened throughout, except Frog Tie Plates, Guard Rails and locations where Spring Clips cannot be physicaly installed such as on turnout plates near heel.
3. Fabricator shall supply all material required for the complete installation of the turnout except switch timber unless otherwise specified in the order.
4. For Switch Timber Schedule, see Plan 2102

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY | RAILROAD OPERATIONS | DWG. NO. 2100 | Oct. 28, 1992 (ISSUE DATE) (2) (ISSUE NO.)

NO. 10 TURNOUT
BILL OF MATERIAL

John D. Ray — ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



TURNOUT DATA

FROG – No. 10 Angle 5°-43'-29"

FROG DIMENSIONS

RAIL SECTION	FROG TYPE	LENGTH		
		TOE	HEEL	TOTAL
115, 132	RBM	9'-6"	13'-6"	23'-0"
115, 132	S.G.	3'-9"	7'-7½"	11'-4½"

SWITCH RAILS

Length ——— 16'-6"
Type ——— Straight
Switch Angle For Samson Switch Points ——— 1°-48'-32"
Heel Block Angle ——— Same As Switch Angle
Point of Switch to P.C. ——— 19'-7"

LEAD

Point of Switch to ½" Point of Frog ——— 77'-4¾"
Degree of Curve ——— 8°-06'-40"
℄ Radius ——— 706.965'

CLOSURE RAIL DIMENSIONS

RAIL SECTION	FROG TYPE	LENGTH OF CLOSURE RAILS	
		CURVED	STRAIGHT
115, 132	RBM	51'-6 11/16"	51'-4¾"
115, 132	S.G.	57'-3 11/16"	57'-1¾"

OFFSETS BEHIND THE HEEL OF FROG

TRACK CENTERS	X	G	H	J	K	L	M	N	O	P
12'-2"	33'-3 7/8"	3'-4 5/8"	4'-3 7/8"	5'-1 5/8"	5'-10"	6'-4 7/8"	6'-10¼"	7'-2 5/8"	7'-4½"	7'-5½"
12'-4"	34'-11 7/8"	3'-6 5/8"	4'-5 7/8"	5'-3 5/8"	6'-0"	6'-6 7/8"	7'-0¼"	7'-4⅛"	7'-6½"	7'-7½"
12'-6"	36'-7⅝"	3'-8 5/8"	4'-7 7/8"	5'-5 5/8"	6'-2"	6'-8 7/8"	7'-2¼"	7'-6⅛"	7'-8½"	7'-9½"
12'-8"	38'-3¾"	3'-10 5/8"	4'-9 7/8"	5'-7 5/8"	6'-4"	6'-10 7/8"	7'-4¼"	7'-8⅛"	7'-10½"	7'-11½"
12'-10"	39'-11¾"	4'-0 5/8"	4'-11 7/8"	5'-9 5/8"	6'-6"	7'-0 7/8"	7'-6¼"	7'-10⅛"	8'-0½"	8'-1½"
13'-0"	41'-7⅝"	4'-2 5/8"	5'-1 7/8"	5'-11 5/8"	6'-8"	7'-2 7/8"	7'-8¼"	8'-0⅛"	8'-2½"	8'-3½"
13'-2"	43'-3½"	4'-4 5/8"	5'-3 7/8"	6'-1 5/8"	6'-10"	7'-4 7/8"	7'-10¼"	8'-2⅛"	8'-4½"	8'-5½"
13'-4"	44'-11⅝"	4'-6 5/8"	5'-5 7/8"	6'-3 5/8"	7'-0"	7'-6 7/8"	8'-0¼"	8'-4⅛"	8'-6½"	8'-7½"
13'-6"	46'-7½"	4'-8 5/8"	5'-7 7/8"	6'-5 5/8"	7'-2"	7'-8 7/8"	8'-2¼"	8'-6⅛"	8'-8½"	8'-9½"

Values for track centers not shown may be determined by interpolation

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2101

Nov. 17, 1986 (1)

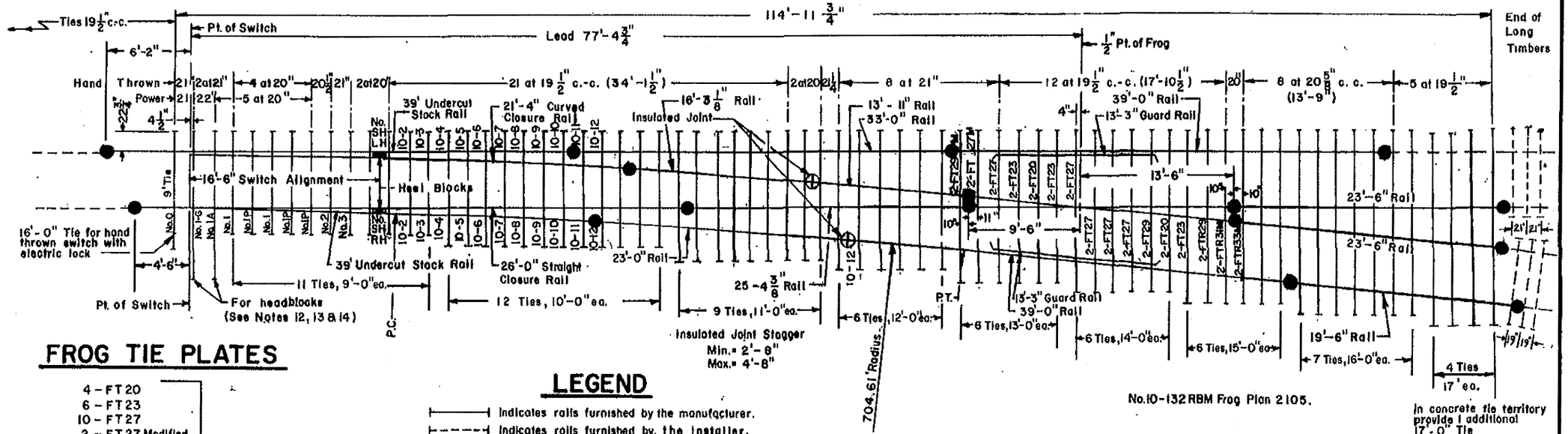
ISSUE DATE ISSUE NO.

OFFSETS FOR NO. 10 TURNOUT

115 OR 132 R.E. RAIL-UNDERCUT

Daniel Breen — ENGINEERING OFFICER

W A MacDonald — CHIEF ENGINEERING OFFICER



FROG TIE PLATES

4 – FT 20	Plan 2326
6 – FT 23	
10 – FT 27	
2 – FT 27 Modified	
2 – FT 29	
2 – FT 29 Modified	
2 – FTR 29	
2 – FTR 31 Modified	
2 – FTR 33 Modified	

LEGEND

- Indicates rails furnished by the manufacturer.
- Indicates rails furnished by the installer.
- Indicates joints at heel of switch – not to be welded.
- Indicates insulated joints with 3/16" opening, (Bolted, Poly Type) See Note 16.
- Indicates joints to be field welded

NOTES

1 – Stock rails and switch points and all rails furnished to be fully heat treated.
2 – Switch points per A.R.E.A. detail 5100 as shown on plan 2104.
3 – 39' stock rails, to be undercut as per Plan 2104.
4 – For switch details see Plan 2104
5 – Gage plate No. I-G as per Plan 2106.
6 – Switch plates Nos. O, I, IA and IP as per Plan 2106.
7 – Turnout plates, No. 2 thru No. 12, as per Plan 2340.
8 – Vertical insulated switch rods and adjustable rocker clips, generally as per Plan 2107.
9 – Heel block as per Plan 2350.
10 – All rails, including switch rails, to be drilled as shown on this plan, except that first hole is not to be drilled by the manufacturer. Forces designated by the Authority to field drill first hole when necessary.
11 – All tie plates to be resiliently fastened except frog tie plates and guard rails.
12 – Two 9"x 10"x 13' Headblocks needed with switch stand 3' high or less, 16' long with stands over 3'
13 – Three 9"x 10" x 16' Headblocks needed for hand thrown switch with electric lock.
14 – Two 9"x 10" x 12' Headblocks needed for power operated switch.
15 – See Plan 2100 for Bill of Material.
16 – Use bolted, poly type insulated joints except when revenue passenger service operates over joints. In that case, use bonded insulated joint plug rails and modify rail lengths accordingly.
17 – Rail lengths are computed to allow a 1/8" gap for temporarily bolting of the field welded joints and 3/16" gap for insulated joints. When rails are welded in the field, they must be cut to provide gaps recommended by the weld kit manufacturer.

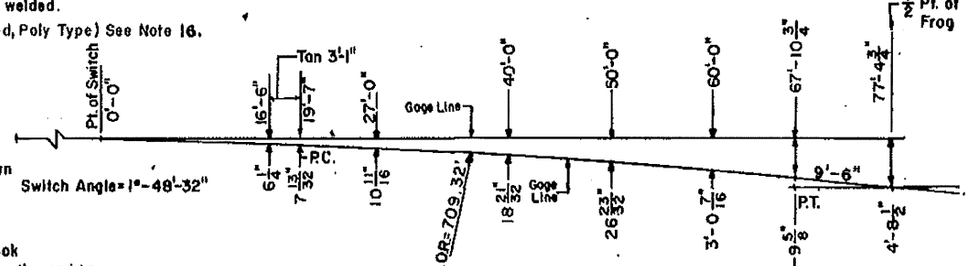
LONG TIMBERS REQUIRED

Headblocks not shown in table, see notes 12, 13 & 14.

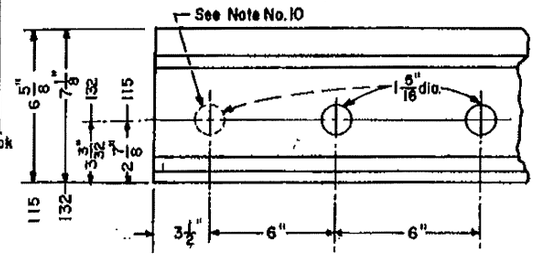
QUANTITY	LENGTH
12 *	9'-0"
12	10'-0"
9	11'-0"
6	12'-0"
6	13'-0"
6	14'-0"
6	15'-0"
7	16'-0"
4 **	17'-0"
68 †	Total

† 67 w. electric lock

*11 with electric lock
** 5-17'-0" ties in concrete tie territory



OFFSETS FOR NO. 10 R.H. TURNOUT



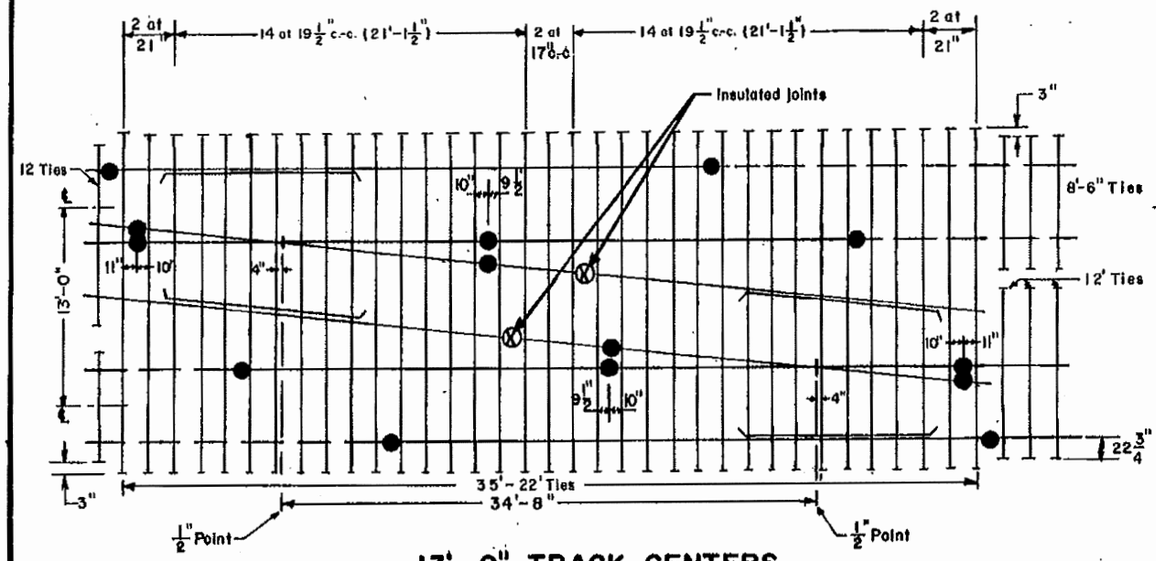
RAIL END DRILLING

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS
DWG. NO. 2102	
Oct. 28, 1992 (2)	
ISSUE DATE	ISSUE NO.

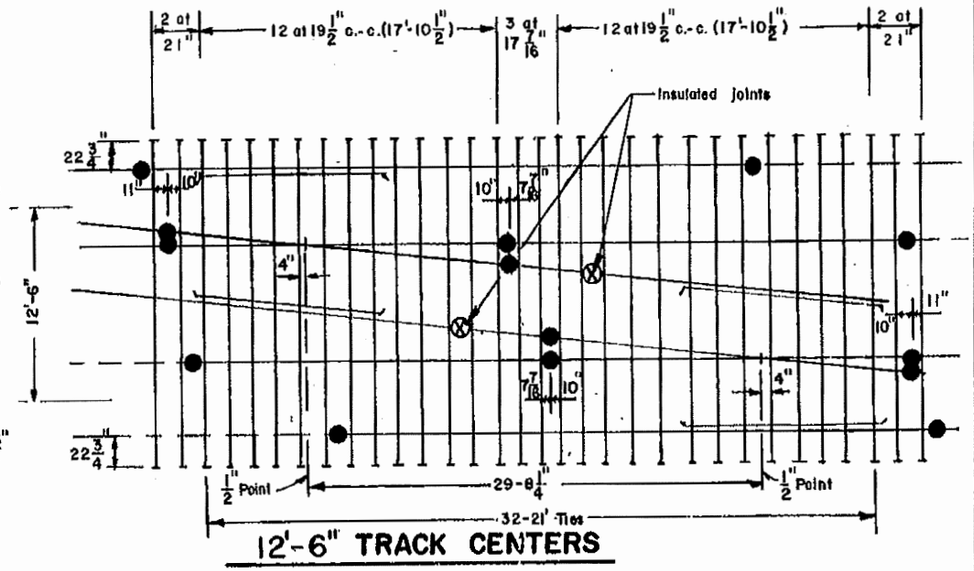
NO. 10 WELDED TURNOUT TIE AND RAIL LAYOUT

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER

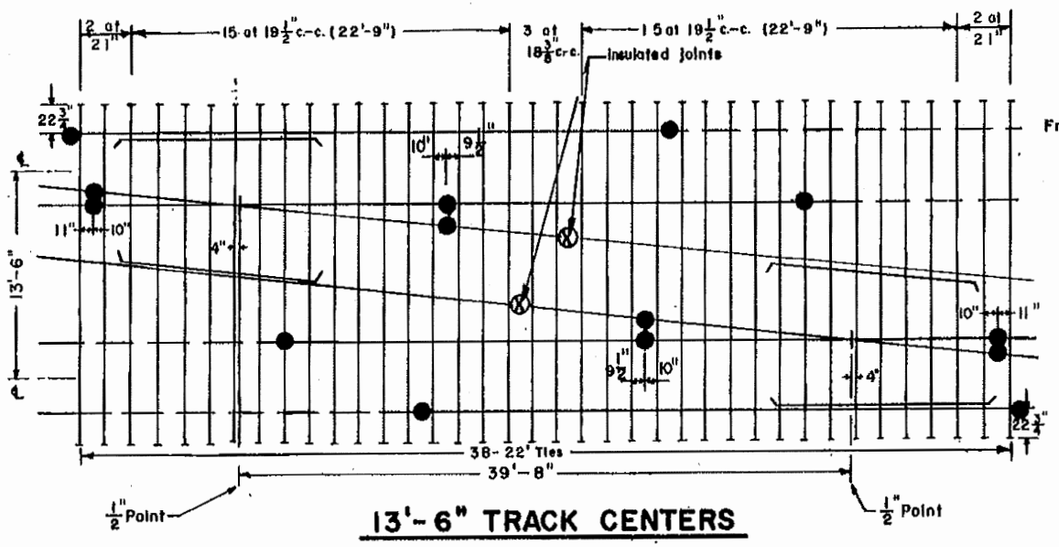


13'-0" TRACK CENTERS



12'-6" TRACK CENTERS

For every 1" change in track centers, the horizontal distance between ½" frog points will change 10" (approx.)



Frog Angle = 5°-43'-29"

13'-6" TRACK CENTERS

SWITCH TIMBER FOR A CROSSOVER

TRACK CENTERS	TIMBER LENGTHS						
	9'-0"	10'-0"	11'-0"	12'-0"	13'-0"	21'-0"	22'-0"
12'-6"	24	24	18	12	–	32	–
13'-0"	24	24	18	12	–	–	35
13'-6"	24	24	18	12	–	–	38

FOR HEADBLOCKS, ADD THE FOLLOWING 9" x 10" TIMBERS:

Handthrown Switch – 4 - 13'-0" with switchstand less than 3' high, 16'-0" w/ 3' stand.
*Handthrown Switch with Electric Locking - 6 - 16'-0" and delete 2-9'-0" from Table
Power Operated Switch – 4-12'-0"

NOTE: Timber layout shown is for exact track centers indicated. Other track centers require adjusting the timber schedule and timber spacing as required.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2103

Oct. 28, 1992 (2)
ISSUE DATE ISSUE NO.

NO. 10 CROSSOVER TIE AND RAIL LAYOUT

John D. Ray
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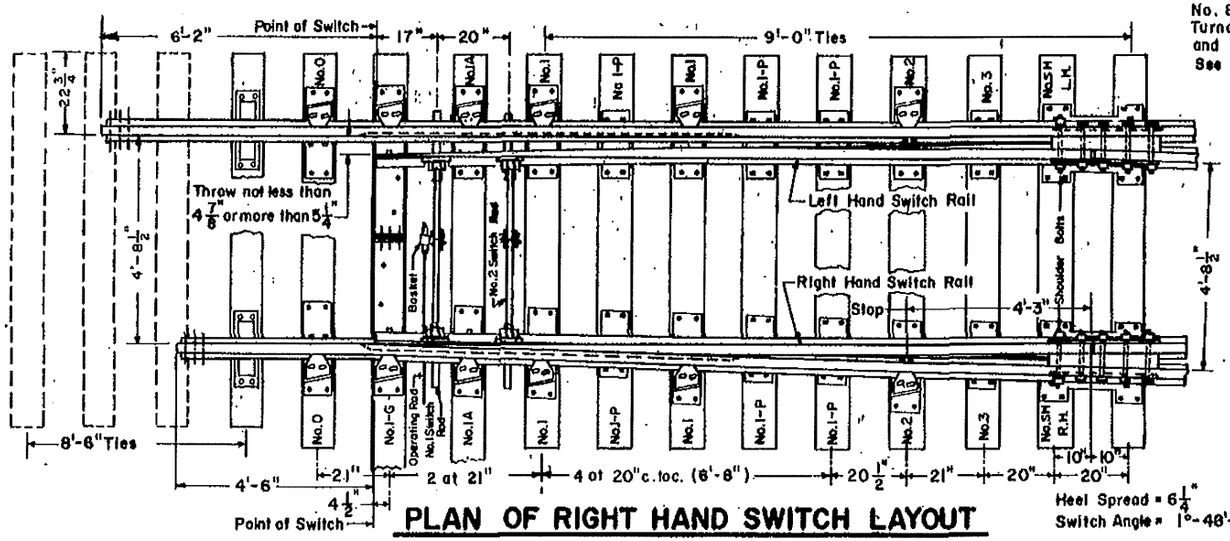
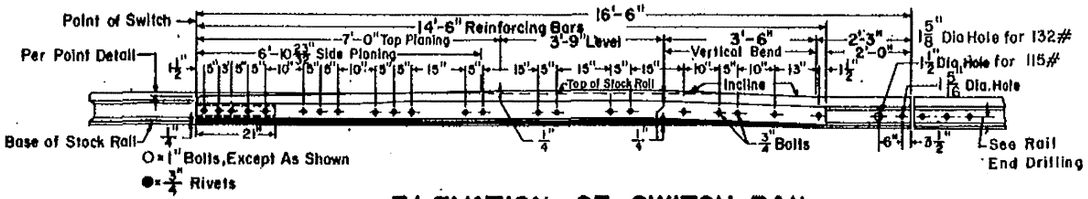
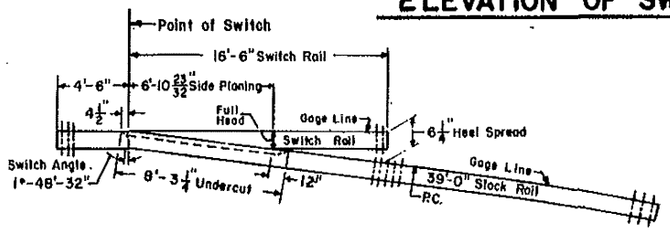
CHIEF ENGINEERING OFFICER



PLAN OF RIGHT HAND SWITCH LAYOUT

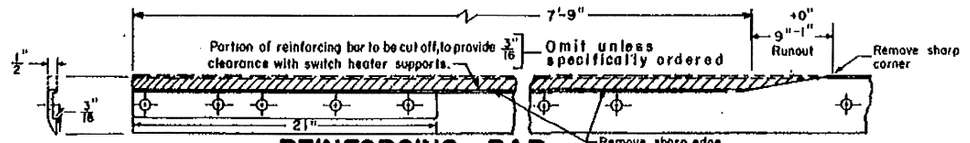


ELEVATION OF SWITCH RAIL



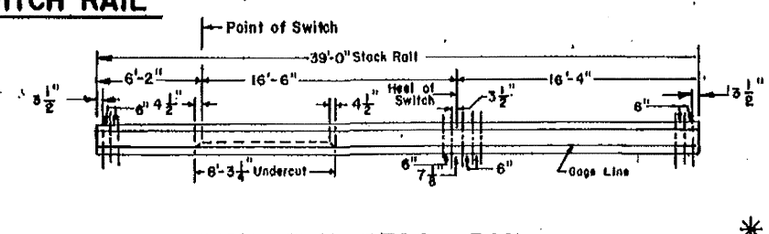
BENT STOCK RAIL

(R.H. As Shown)



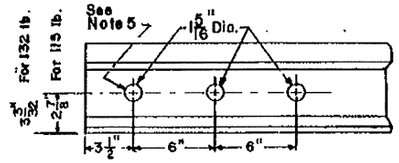
REINFORCING BAR

(Stock Rail Side)

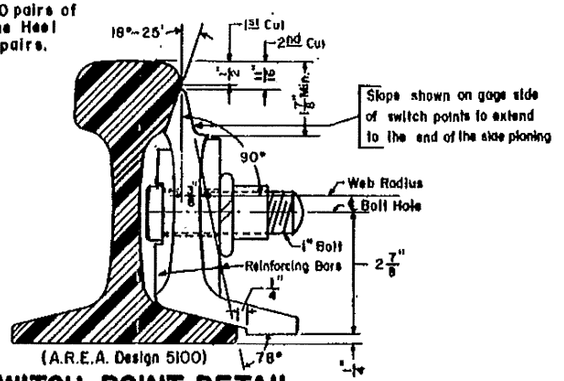


STRAIGHT STOCK RAIL

(L.H. As Shown)



RAIL END DRILLING



SWITCH POINT DETAIL

BILL OF MATERIAL

1 - Pair 16'-6" Straight Switch Points, complete with reinforcing bars, side jaw clips and rail stops attached.
* 1 - 39'-0" Straight Stock Rail, L.H. Undercut
* 1 - 39'-0" Bent Stock Rail, R.H. Undercut
2 - Vertical Switch Rods, with basket. See Plan 2107
2 - Heel Block Assemblies, complete. See Plan 2350
1 - No. 1-G Insulated Gage Plate
2 - No. 0 Adjustable Brace Slide Plate
2 - No. 1-A " " " "
4 - No. 1 " " " "
2 - No. 2 " " " "
6 - No. 1-P Shoulder Slide Plate
2 - No. 3 " " "
2 - No. SH Heel Plates, 1-R.H. & 1-L.H.
4 - Slide Jaw Clips for Vertical switch rods. See Plan 2107
12 - Adjustable Rail Braces, Resilient Type - Plan 2352
2 - Switch Stops, See Plan 2350.

(See Plan 2106)

TURNOUT INFORMATION

OFFSETS -
No. 8 T.O. - Plan 2081
No. 10 T.O. - Plan 2101

RAIL and TIE LAYOUT
No. 8 T.O. - Plan 2082
No. 10 T.O. - Plan 2102

NOTES

1 - This plan is for use with A.R.E.A. recommended standards for 115 & 132 RE Rail.
2 - Stock rails and switch points and all rail supplied, to be fully heat treated.
3 - All bolts shall be dipped immediately before applying (so that all threads are thoroughly coated) in grease.
* 4 - When ordering a Left Hand Switch - these items shall be opposite hand.
5 - The first end hole is not to be drilled by the manufacturer. Installer to field drill first hole when necessary.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

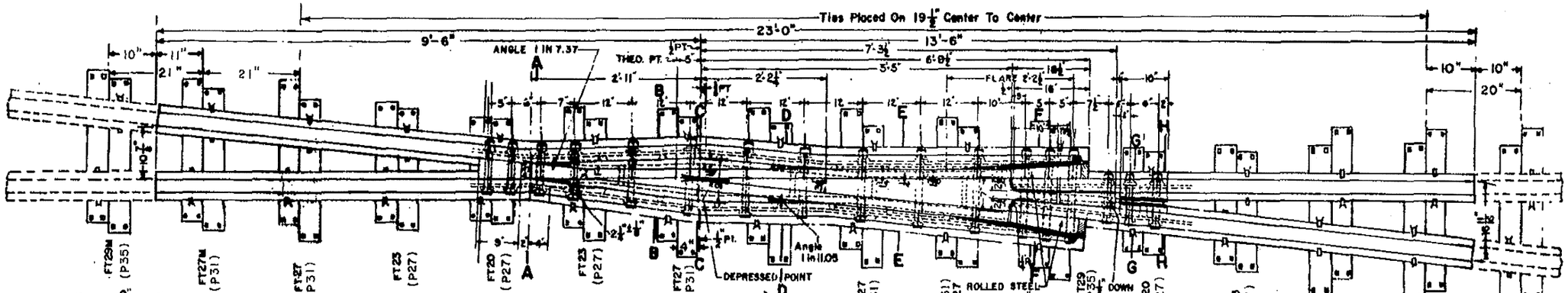
DWG. NO. 2104

Jan. 5, 1996 (3)
ISSUE DATE ISSUE NO.

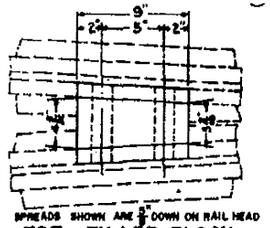
16'-6" STRAIGHT SPLIT SWITCH

115 OR 132 R.E. RAIL - INSULATED & UNDERCUT

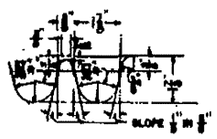
John D. Ray
SECTION CHIEF



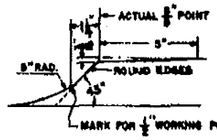
Frog Angle = 5°-43'-29"



TOE FILLER BLOCK

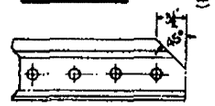


SECTION AT POINT

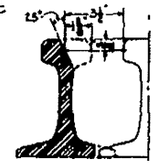


ELEVATION OF POINT

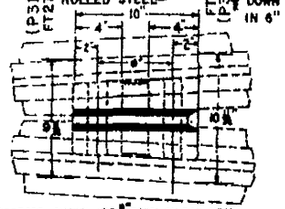
PLAN



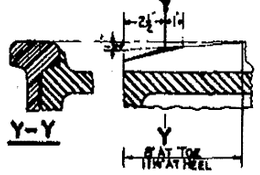
BEVELED END WING RAIL



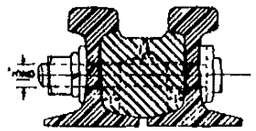
PLANING AT END OF WING RAIL



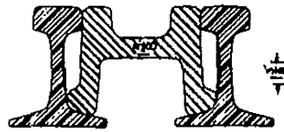
HEEL FILLER BLOCK



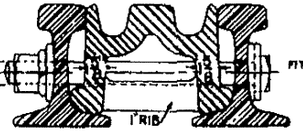
Y-Y



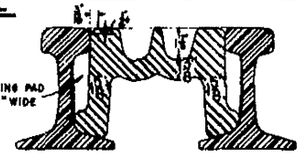
SECTION A-A



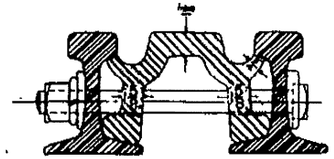
SECTION B-B



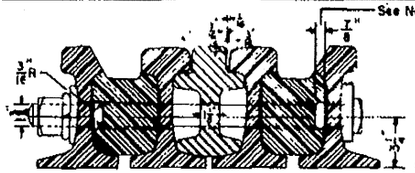
SECTION D-D



SECTION C-C



SECTION E-E



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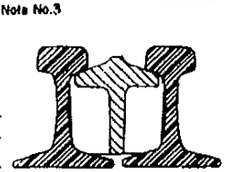
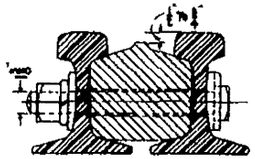
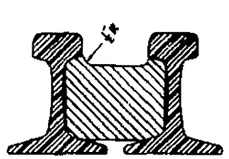


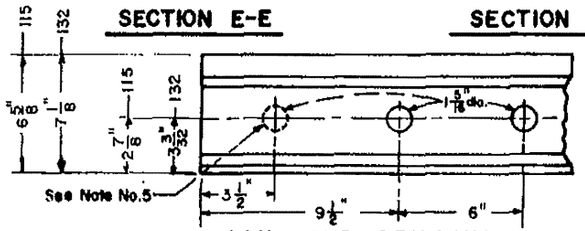
SECTION G-G



SECTION H-H



SECTION J-J



RAIL END DRILLING

NOTES

1 – This plan is for use with A.R.E.A. recommended standards for 115 and 132 lb RE Rail, Heavy Wall Section.

2 – Workmanship and materials including beveling shall be per current A.R.E.A. "Specifications".

3 – Groove for bond wires shall extend from end of filler block at least to the center line of second bolt hole.

4 – All bolts used in construction of frog, shall be dipped immediately before applying (so that all threads are thoroughly coated) in grease.

5 – When frog is to be used in bolted track, the first bolt hole to be drilled in the field by the Installer.

6 – Casting to be explosion hardened, with toe and heel arms to be fully heat treated rails.

7 – Both FT Plates and SAS Plates (in parenthesis) shown. Furnish SAS Plates unless otherwise specified.

10 – P27 SAS (Self Aligning Shoulder)
12 – P31 SAS
4 – P35 SAS
4 – PR27 SAS
2 – PR31 SAS
Plan 2328

Unless otherwise specified, furnish SAS Plates rather than FT Plates.

4 – FT20
6 – FT23
10 – FT27
2 – FT27 Modified
2 – FT29
2 – FT29 Modified
2 – FTR29
2 – FTR31 Modified
2 – FTR33 Modified
Plan 2326

FROG TIE PLATES REQUIRED

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

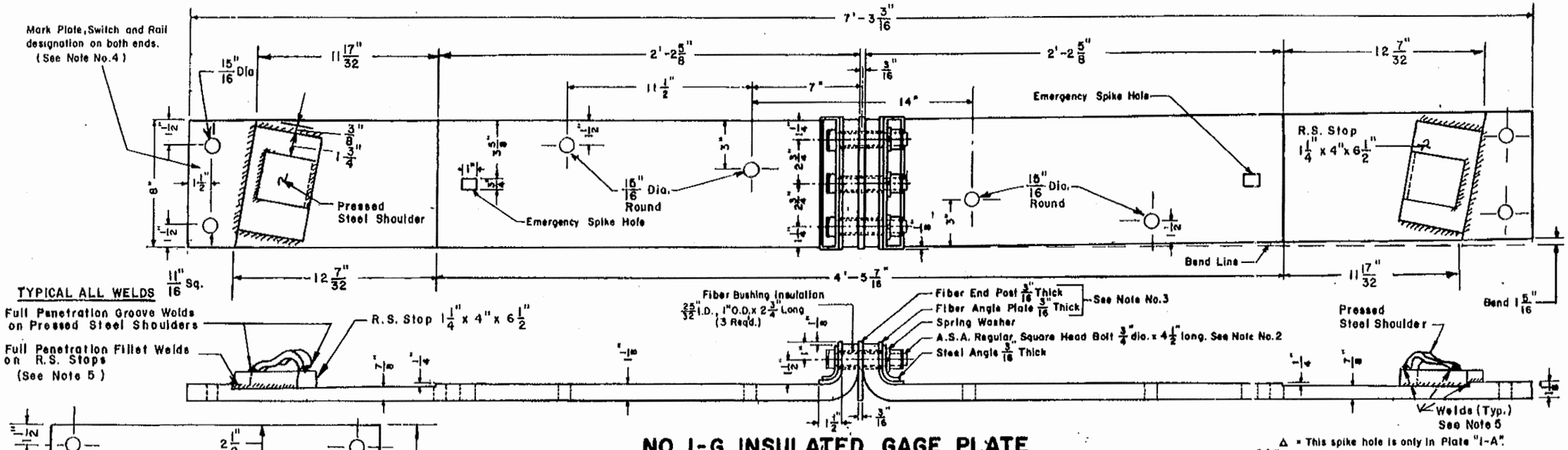
DWG. NO. 2105

Jan. 5, 1996 (3)
ISSUE DATE ISSUE NO.

No. 10 RAILBOUND MANGANESE STEEL FROG

FOR 115 LB. OR 132 LB. R.E. RAIL

John D. Ray
SECTION CHIEF


Mark Plate, Switch and Rail designation on both ends. (See Note No.4)
7'-3 3/16"
11 17/32"
2'-2 5/8"
2'-2 5/8"
12 7/32"
15/16" Dia
11 1/2"
7"
14"
3/16"
Emergency Spike Hole
R.S. Stop 1 1/4" x 4" x 6 1/2"
Pressed Steel Shoulder
15/16" Dia. Round
Emergency Spike Hole
15/16" Dia. Round
Bend Line
11/16" Sq.
12 7/32"
4'-5 7/16"
11 17/32"
Bend 1 5/16"
TYPICAL ALL WELDS
Full Penetration Groove Welds on Pressed Steel Shoulders
Full Penetration Fillet Welds on R.S. Stops (See Note 5)
R.S. Stop 1 1/4" x 4" x 6 1/2"
Fiber Bushing Insulation 25/32" I.D., 1" O.D. x 2 3/4" Long (3 Req'd.)
Fiber End Post 3/16" Thick
Fiber Angle Plate 5/16" Thick
See Note No.3
Spring Washer
A.S.A. Regular, Square Head Bolt 3/4" dia. x 4 1/2" long. See Note No.2
Steel Angle 3/16" Thick
Pressed Steel Shoulder
Welds (Typ.) See Note 5
NO. I-G INSULATED GAGE PLATE
2 1/2"
15/16" Dia. Round
Pressed Steel Shoulder (See Note 6)
6"
22"
NO.3 SHOULDER SLIDE PLATE
Pressed Steel Shoulder
2 1/2"
15/16" Dia. Round (4 holes)
6"
6 3/32"
22" I-P; 24" HP
Mark Plate, Switch and Rail designations here. (See Note No.4)
NO. I-P & HP SHOULDER SLIDE PLATE
28"
8"
Provide holes for cut spikes at shoulder bolt end.
15/16" Dia. Round
Pressed Steel Shoulders
10"
10"
(L.H. as shown — R.H. is opposite hand)
NO.SH (R.H. & L.H.) HEEL PLATES
△ = This spike hole is only in Plate "I-A".
28"
11 17/32"
12"
3/8"
1 3/4"
Pressed Steel Shl'd. on Plate 0 only
Mark Plate, Switch and Rail designations here. (See Note No.4)
Pressed Steel Shoulder
15/16" Dia. Round
12 7/32"
R.S. Stop 1/4" x 4" x 6"
1/16" For Plate 2 - See Note 6
1/4" For Plates 0, I & I-A
1" For Plate 2
1 1/8" For Plates 0, I & I-A
NO. 0, NO. I, NO. I-A & NO. 2 ADJUSTABLE BRACE SLIDE PLATES

7- For adjustable brace used with these plates, see Dwg. 2352.

NOTES

1 - Switch Plates shall conform to current A.R.E.A. Specifications for Low-Carbon Steel Tie Plates, with copper.

2 - All gage plate bolts shall have A.S.A. Regular square heads and A.S.A. Heavy square nuts. All bolts shall be carbon-steel with medium-carbon steel nuts and conform to current A.R.E.A. "Specifications for Heat-Treated Carbon-Steel Track Bolts and Carbon Steel Nuts."

3 - All fiber parts shall conform to current A.A.R. Signal Section Manual, Part 58, Specification No. 13 for "Hard Fiber" and A.A.R Signal Section Manual, Part No. 178 covering "Requisites for Fabricated Fiber Parts for Track Insulation."

4 - Each plate shall be marked by deeply cut characters, not less than one half inch high, in the position as indicated on this plan, with the plate, switch and rail designations. Example I-P, 16-6, 132

5 - Welds shall be made so they do not interfere with the installation of resilient fasteners, rail braces and rail.

6 - Modify contour of pressed steel shoulders or, use shims on plates 2 and 3 to maintain uniform toe pressure from the resilient fasteners.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2106

Oct. 28, 1992 (2)

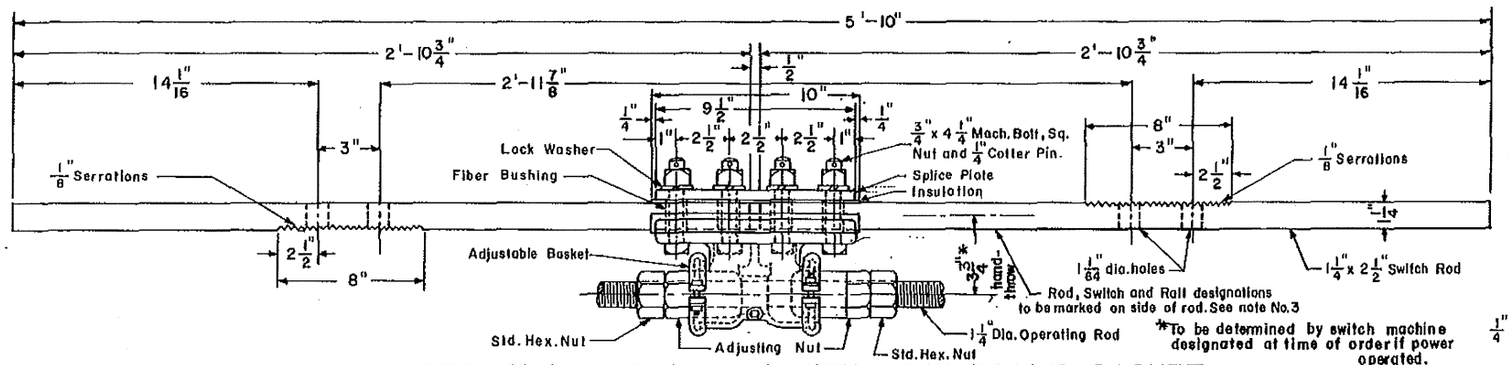
ISSUE DATE. ISSUE NO.

SWITCH PLATES and GAGE PLATES

FOR 16'-6" SWITCH - 132 LB. RAIL

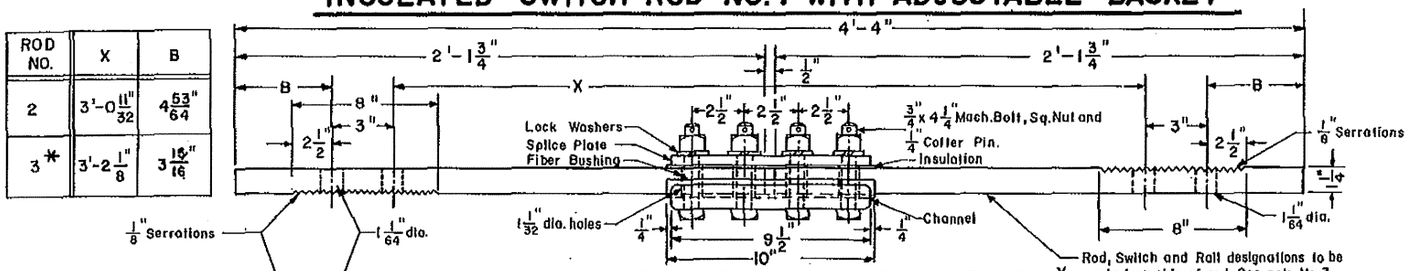
John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER

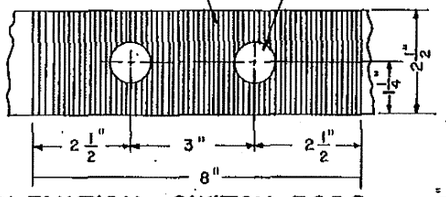


INSULATED SWITCH ROD NO. 1 WITH ADJUSTABLE BASKET

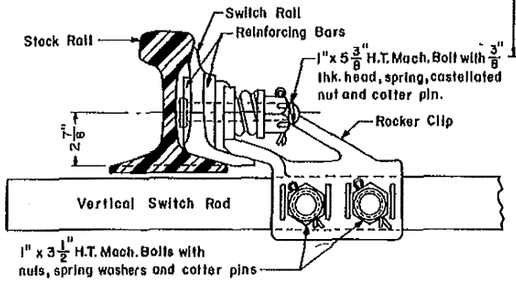
ROD NO.	X	B
2	3'-0 11/32"	4 53/64"
3*	3'-2 1/8"	3 15/16"



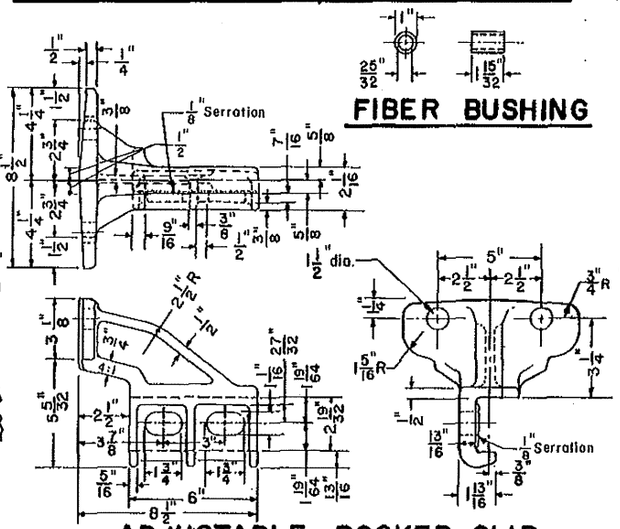
INSULATED SWITCH RODS-NOS. 2 & 3*



ELEVATION -- SWITCH RODS

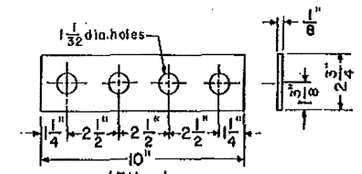

Switch Rail
Stock Rail
Reinforcing Bars
1" x 5 3/8" H.T. Mach. Bolt with 3/8" thk. head, spring, castellated nut and cotter pin.
Rocker Clip
Vertical Switch Rod
1" x 3 1/2" H.T. Mach. Bolts with nuts, spring washers and cotter pins

ASSEMBLED ROCKER CLIP

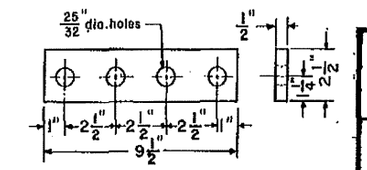


ADJUSTABLE ROCKER CLIP

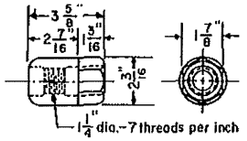
FIBER BUSHING



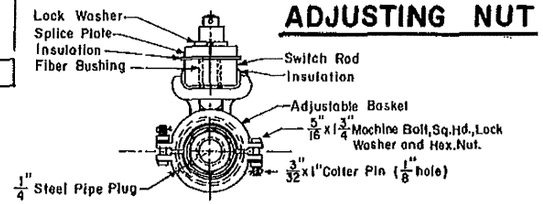
INSULATION PLATE FOR SPLICE PLATE



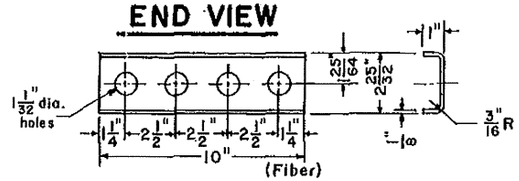
SPLICE PLATE



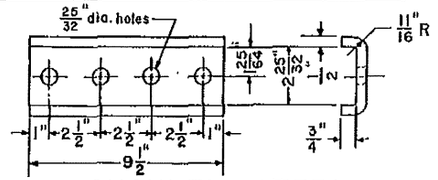
ADJUSTING NUT



END VIEW



INSULATION FOR CHANNEL



CHANNEL - STEEL

NOTES

1- All switch rods shall conform to current A.R.E.A. Specifications.

2- All fiber parts shall conform to current A.A.R. Signal Section Manual, Part 58, Specifications 13 - Hard Fiber.

3- Each switch rod shall be marked with deeply cut characters, not less than 1/2" high, with rod, switch and rail designations.

*4 - No. 3 Rod is not required for turnouts with solid heel blocks but is required with floating heel blocks.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2107

Oct. 28, 1992 (2)

ISSUE DATE ISSUE NO.

VERTICAL SWITCH RODS AND ADJUSTABLE ROCKER CLIPS

FOR 16'-6" SWITCH - 115 LB. OR 132 L.B. RE RAIL

John D Ray

ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER

NO. 10 TURNOUT WITH FLOATING HEEL BLOCKS - BILL OF MATERIAL

QUANTITY	DESCRIPTION	REFERENCE PLAN NO.
1*	PAIR 27'-0" SWITCH POINTS COMPLETE WITH REINFORCING BARS, CLIPS AND STOPS ATTACHED.	2114
2	FLOATING HEEL BLOCKS	2350
2	60'-0" UNDERCUT STOCK RAILS	2360
1	INSULATED GAGE PLATES (NO. 1G)	2106
2	NO. 0 ADJUSTABLE BRACE SLIDE PLATES	2106
6	NO. 1 ADJUSTABLE BRACE SLIDE PLATES	2106
2	NO. 1A ADJUSTABLE BRACE SLIDE PLATES	2106
8	NO. 1P SHOULDER SLIDES PLATES	2106
4	NO. HP HEEL PLATES	2106
2	SWITCH RAIL STOPS	2350
6	ADJUSTABLE ROCKER CLIPS FOR VERTICAL SWITCH RODS	2107
3	INSULATED VERTICAL SWITCH RODS (NO. 1, 2 & 3)	2107
22*	TURNOUT PLATES FOR USE BEHIND HEEL OF SWITCH (NO. 10-2 R/L TO 10-5 R/L & NO. 10-6 TO 10-12)x2	2342
12	RESILIENTLY FASTENED ADJUSTABLE RAIL BRACE	2352
1	NO. 10 RAILBOUND MANGANESE STEEL FROG, COMPLETE	2105
10	NO. P27 SELF ALIGNING SHOULDER TIE PLATE	2328
12	NO. P31 SELF ALIGNING SHOULDER TIE PLATE	2328
4	NO. P35 SELF ALIGNING SHOULDER TIE PLATE	2328
4	NO. PR27 SELF ALIGNING SHOULDER TIE PLATE	2328
2	NO. PR31 SELF ALIGNING SHOULDER TIE PLATE	2328
2	13'-3" MANGANESE STEEL ONE PIECE GUARD RAILS	2302
2	19'-6" BONDED INSULATED JOINT PLUG RAIL	1340
2	78'-0" LENGTHS OF FULLY HEAT TREATED RAIL	-
-	39'-0" LENGTHS OF FULLY HEAT TREATED RAIL	-
1 EA.	VARIOUS LENGTHS OF FULLY HEAT TREATED RAIL AS FOLLOWS: 40'-10½", 24'-6", 24'-6", 21'-6½"	-
840	¾" SCREW SPIKES	1218
58**	¾" x 6" TRACK DRIVE SCREWS	1217
404	RESILIENT FASTENER SPRING CLIPS - TYPE "E"	-
8	RESILIENT FASTENER SPRING CLIPS - TYPE MODIFIED "E"	-
14	1:80 CANT TRANSITION TIE PLATES	2348
126	RESILIENT FASTENER TIE PLATES FOR SCREW SPIKES	1225
16	STANDARD JOINT BAR ASSEMBLIES	1322
64	STANDARD TRACK BOLTS WITH NUTS & WASHERS	1332

* THESE ITEMS SHALL BE SUPPLIED FOR R.H., L.H. OR EQUILATERAL TURNOUT, AS REQUIRED.
+ FOR EQUILATERAL TURNOUTS, CLOSURE RAILS HAVE SLIGHTLY DIFFERENT LENGTHS.
** SUPPLIED BY THE INSTALLER

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

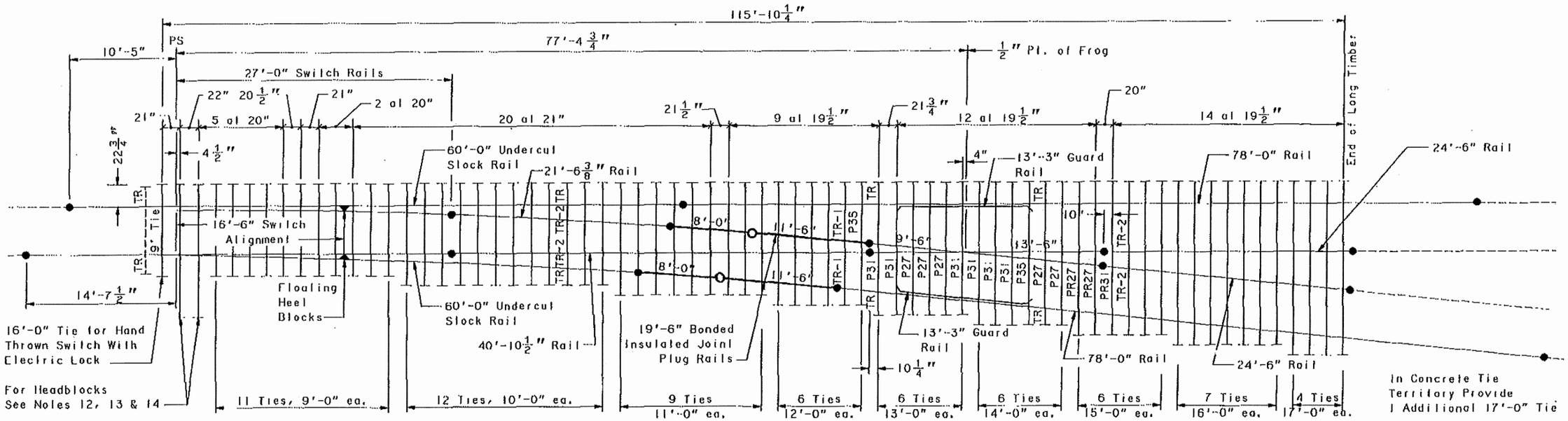
DWG. NO. 2110

JAN. 5, 1996 ISSUE DATE

2 ISSUE NO.

NO. 10 FLOATING HEEL BLOCK TURNOUT
BILL OF MATERIAL

John D. Kary
SECTION CHIEF



FROG TIE PLATES

10 - P27 SAS (Self-Aligning Shoulder)
12 - P31 SAS
4 - P35 SAS
4 - PR27 SAS
2 - PR31 SAS

NOTES

1-Slock rails and switch points and all rails furnished to be fully heat treated.
2-Switch Points per A.R.E.A. Detail 5100 as shown on Plan 2104.
3-60' slock rails, to be undercut as per Plan 2360.
4-For switch details see Plan 2114.
5-Gage plate No. 1 - G as per Plan 2106.
6-Switch plates Nos. 0, 1, 1A, 1P and HP as per Plan 2106.
7-Turnout plates, No. 2 thru No. 12, as per Plan 2342.
8-Vertical insulated switch rods and adjustable rocker clips, as per Plan 2107.
9-Floating Heel block as per Plan 2350.
10-All rails to be drilled as shown on this plan, except that first hole is not to be drilled by the manufacturer. Installer to field drill first hole when necessary.
11-All tie plates to be resiliently fastened except guard rails.
12-Two 9"x10"x13' Headblocks needed with switch stand 3' high or less, 16' long with stands over 3'.
13-Three 9"x10"x16' Headblocks needed for hand thrown switch with electric lock.
14-Two 9"x10"x12' Headblocks needed for power operated switch.
15-See Plan 2110 for Bill of Material.
16-Rail lengths are computed to allow a 1/8" gap for temporarily bolting the field joints and 3/16" gap for insulated joints. When rails are welded in the field, they must be cut to provide gaps recommended by the weld kit manufacturer.
17-Transition Plates (TR) 1:80 Cant, as per Plan 2348.

LEGEND

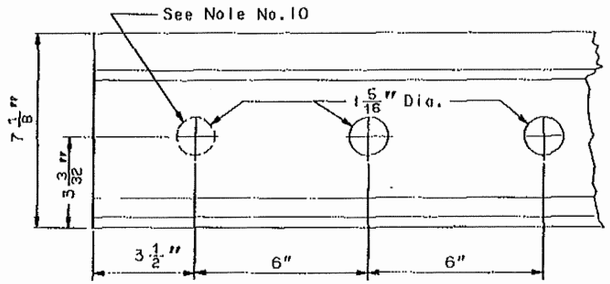
Indicates rails furnished by the manufacturer.
Indicates rails furnished by the Installer.
Indicates "Floating" heel blocks.
Indicates insulated joints with 3/16" opening.
Indicates joints to be field welded.
Indicates Bonded Insulated Joint Plug Rail

LONG TIMBERS REQUIRED

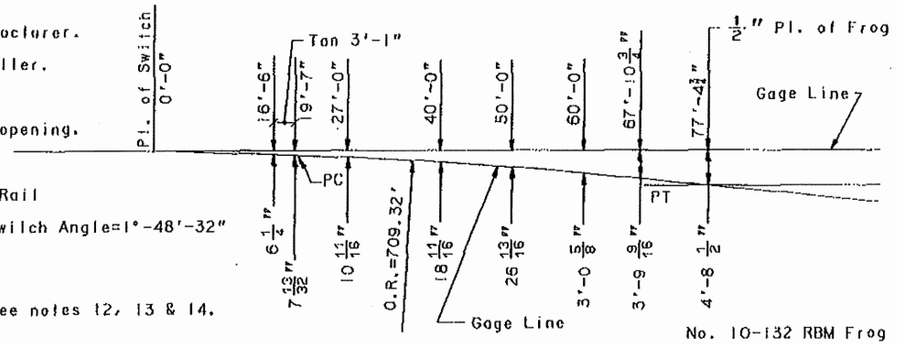
Quantity	Length
12*	9'-0"
12	10'-0"
9	11'-0"
6	12'-0"
6	13'-0"
6	14'-0"
6	15'-0"
7	16'-0"
4**	17'-0"
68	Total

+67 w. electric lock

-Headblocks not shown in table, see notes 12, 13 & 14.
* 11 with electric lock
** 5, 17'-0" ties in concrete tie territory



RAIL END DRILLING



No. 10-132 RBM Frog

OFFSETS FOR NO. 10 R.H. TURNOUT

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

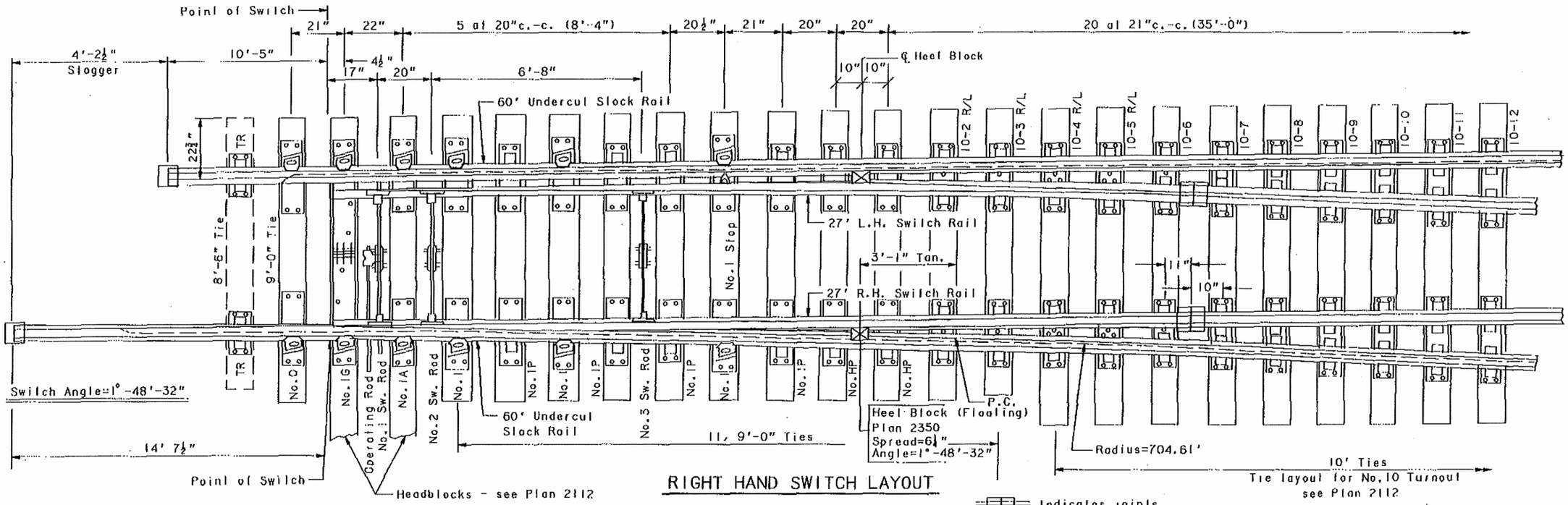
DWG. NO. 2112

JAN. 5, 1996 ISSUE DATE

(2) ISSUE NO.

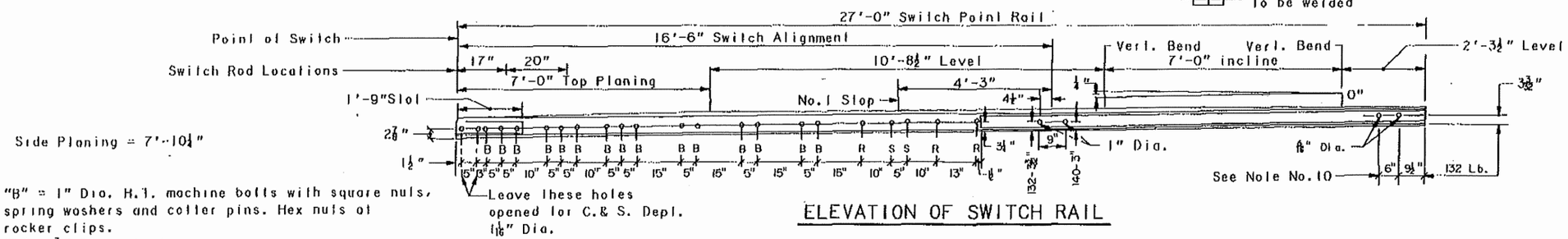
NO. 10 TURNOUT WITH FLOATING HEEL BLOCKS - TIE & RAIL LAYOUT

John D. Reny
SECTION CHIEF



RIGHT HAND SWITCH LAYOUT

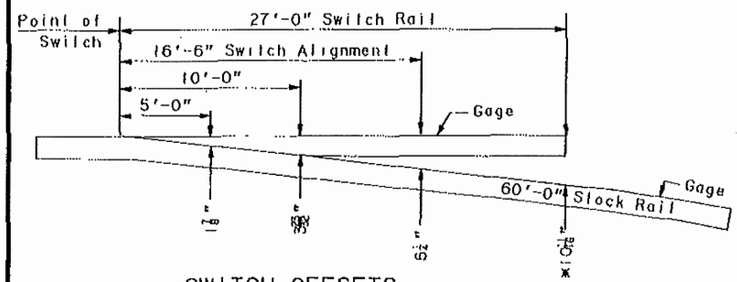
Indicates joints to be welded



ELEVATION OF SWITCH RAIL

⅞" Screw Lags to be used on all plates within turnout

"B" = 1" Dia. H.T. machine bolts with square nuts, spring washers and cotter pins. Hex nuts at rocker clips.
"R" = ¾" Dia. rivets.
"S" = ¾" machine bolts for slops with square nuts, spring washers and ¾" cotter pins.



SWITCH OFFSETS

*11" for No.8 Turnout

NOTES

1. - This plan for use with A.R.E.A. recommended standards for 132 R.E.,
2. - Workmanship and materials shall be as per current A.R.E.A. Specifications.
3. - Gage Plate 1-G as shown on Plan 2106.
4. - Switch Plates Nos. 0,1,1a,1p,HP shown on Plan 2106.
5. - Turnout Plates No. 2 thru No. 12 as shown on Plan 2342.
6. - Slock Rails to be undercut as per Plan 2360.
7. - Switch Rails to be undercut per A.R.E.A. Design 5100.
8. - All rails to be Fully Heat Treated.
9. - Vertical insulated switch rods and adjustable rocker clips as per Plan 2107.
10. - All rails, including switch rails, to be drilled per Plan 2112 for 132 R.E. rail, with the first hole not to be drilled by manufacturer. Installer to field drill first hole when necessary.
11. - See Plan 2110 for Bill of Material.
12. - All bolts shall be dipped in a non oxidizing grease immediately before applying so that all threads are thoroughly coated.

For placing of special plates 10-2 thru 10-12, see Plan 2342.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2114

JAN. 5, 1996 ISSUE DATE

(2) ISSUE NO.

16'-6" STRAIGHT SPLIT SWITCH WITH FLOATING HEEL BLOCKS

John D. Ramy
SECTION CHIEF

BILL OF MATERIAL FOR A NO. 15 TURNOUT

Quantity	Description	Reference Plan No.
* 1	Pair of 26'-0" Switch Points, complete with reinforcing bars, clips and stops attached	2155
2	Heel Block Assemblies, complete	2350
* 2	39'-0" Undercut Stock Rails	2155
3	Insulated Gage Plates (No's. 0-G, 1-G, 2-G)	2155
8	No. 1 Adjustable Brace Slide Plates	2157
2	No. 3 Adjustable Brace Slide Plates	2157
12	No. 1-P Shoulder Slide Plates	2157
2	No. 2 Shoulder Slide Plates	2157
2	No. 4 Shoulder Slide Plates	2157
2	No. SH Heel Plates, 1-RH and 1-LH	2157
4	Switch Rail Stops	2350
8	Adjustable Rocker Clips for Vertical Switch Rods	2158
4	Insulated Vertical Switch Rods (No. 1, 2, 3 & 4)	2158
26	Turnout Plates for use behind heel of switch (15-2 to 15-14 x 2)	2340
16	Resiliently Fastened Adjustable Rail Brace	2352
1	No. 15 Railbound Manganese Steel Frog, Complete	2156
7	FT20 Hook Twin Tie Plates	2326
6	FT23 " " " "	"
16	FT27 " " " "	"
1	FT29 " " " "	"
—	FT33 " " " "	"
2	FT23 Modified Hook Twin Tie Plates	"
2	FT27 " " " " "	"
—	FT29 " " " " "	"
—	FT33 " " " " "	"
2	FTR27 Hook Twin Tie Plates	"
2	FTR29 " " " "	"
2	FTR31 " " " "	"
2	FTR33 " " " "	"
4	FTR27 Modified Hook Twin Tie Plates	"
—	FTR29 " " " " "	"
—	FTR31 " " " " "	"

* These items shall be supplied for R.H., L.H. or Equilateral Turnout as required.

Quantity	Description	Reference Plan No.
—	FTR33 Modified Hook Twin Tie Plates	2326
2	13'-3" Manganese Steel One Piece Guard Rails	2302
—	Bolted, Poly Type Insulated Joint Assembly	—
2	19'-6" Bonded Insulated Joint Plug Rail	1340
6	39'-0" Lengths of Fully Heat Treated Rail	—
1 ea. †	Various Lengths of Fully Heat Treated Rail, as follows: 38'-2 9/16" 36'-8" 35'-0" 28'-7 3/4" 27'-9" 26'-8 1/2" 21'-8" 19'-9 1/4"	—
1840	7" Lock Spikes	1216
120	5/8" x 6" AREA Spikes **	1210
760	Resilient Fastener Spring Clips - Type "E"	—
16	Resilient Fastener Spring Clips - Type Modified "E"	—
310	Standard Resilient Fastener Tie Plates	1224
—	Pairs of Modified Joint Bar Assemblies (Head & Toe of Gage Side Bars Removed to Allow Switch Movement at Joint near Heel of Switch - No. 20 only)	2202
22	Standard Joint Bar Assemblies	1322 or 1320
88	Standard Track Bolts with Nuts and Washers	1332

** Cut Spikes to be furnished by the Installer.
• Weld Kits (22) to be furnished by the Installer.
† For Equilateral Turnout, closure rails have slightly different lenghts, See Equilateral Drawing (2153).

Notes:

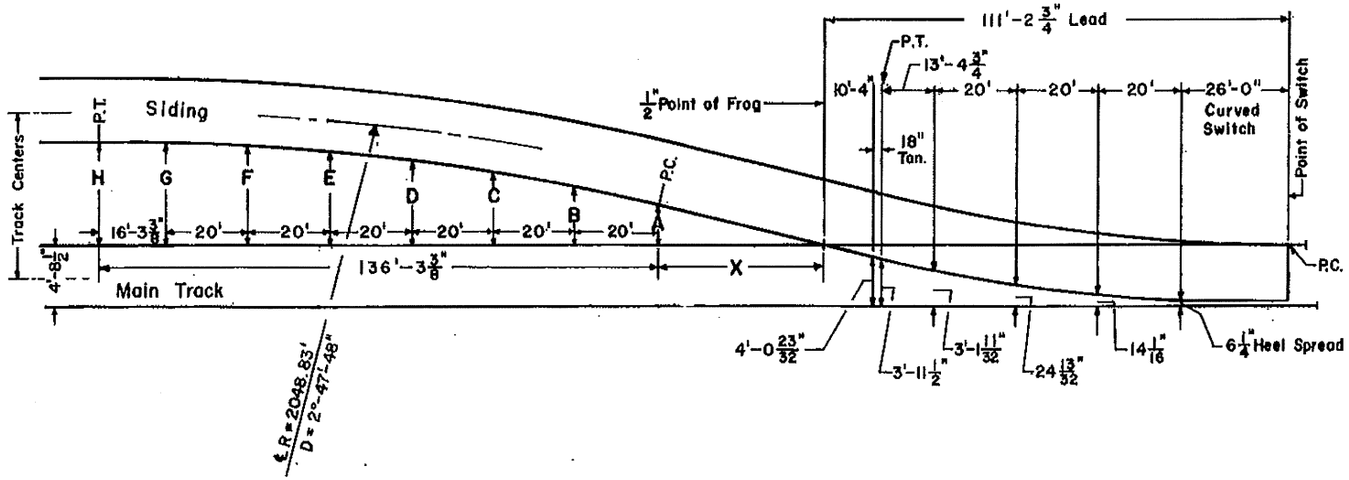
1. Turnouts supplied shall be either 115 or 132 LB. RE as specified in the order.
2. Turnouts shall be resiliently fastened throughout, except Frog Tie Plates, Guard Rails and locations where Spring Clips cannot be physicaly installed such as on turnout plates near heel.
3. Fabricator shall supply all material required for the complete installation of the turnout except switch timber unless otherwise specified in the order.
4. For Switch Timber Schedule, see Plan: 2152.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY | RAILROAD OPERATIONS | DWG. NO. 2150 | Oct. 28, 1992 (2) ISSUE DATE / ISSUE NO.

NO. 15 TURNOUT
BILL OF MATERIAL

John B. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



TURNOUT DATA FOR BOLTED TRACK

FROG - R.B.M.

Number	15
Angle	3°-49'-06"
Toe Length	10'-4"
Heel Length	16'-4"
Total Length	26'-8"

SWITCH RAILS

Length	26'-0"
Type	Curved
Switch Angle For Undercut Points	0°-44'-47"
Heel Block Angle	1°-32'-57"
Point of Curve (P.C.)	At Switch Point

LEAD

Point of Switch to 1/2" Point of Frog	111'-2 3/4"
℄ Radius	1853.415'
Degree of Curve	3°-05'-30"
Length of Curved Closure Rail	75'-0"
Length of Straight Closure Rail	74'-10 3/4"

NOTES

1- The lines of the diagram indicate gage lines.

2- For details see the following plans :-

Switch- 2155 or 2165

Frog-RBM- 2156

3- For welded turnouts see Plan 2152 or 2162 for offsets between the point of switch and the toe of frog.

OFFSETS BEHIND THE HEEL OF FROG

TRACK CENTERS	X	A	B	C	D	E	F	G	H
12'-2"	43'-0 11/16"	2'-11"	4'-1 13/16"	5'-2 6/16"	6'-0 7/16"	6'-8 3/16"	7'-1 5/8"	7'-4 3/4"	7'-5 1/2"
12'-4"	45'-6 5/8"	3'-1"	4'-3 13/16"	5'-4 5/16"	6'-2 7/16"	6'-10 3/16"	7'-3 5/8"	7'-6 3/4"	7'-7 1/2"
12'-6"	48'-0 5/8"	3'-3"	4'-5 13/16"	5'-6 5/16"	6'-4 7/16"	7'-0 3/16"	7'-5 5/8"	7'-8 3/4"	7'-9 1/2"
12'-8"	50'-6 5/8"	3'-5"	4'-7 13/16"	5'-8 5/16"	6'-6 7/16"	7'-2 3/16"	7'-7 5/8"	7'-10 3/4"	7'-11 1/2"
12'-10"	53'-0 9/16"	3'-7"	4'-9 13/16"	5'-10 5/16"	6'-8 7/16"	7'-4 3/16"	7'-9 5/8"	8'-0 3/4"	8'-1 1/2"
13'-0"	55'-6 9/16"	3'-9"	4'-11 13/16"	6'-0 5/16"	6'-10 7/16"	7'-6 3/16"	7'-11 5/8"	8'-2 3/4"	8'-3 1/2"
13'-2"	58-0 1/2"	3'-11"	5'-1 13/16"	6'-2 5/16"	7'-0 7/16"	7'-8 3/16"	8'-1 5/8"	8'-4 3/4"	8'-5 1/2"
13'-4"	60-6 5/8"	4'-1"	5'-3 13/16"	6-4 5/16"	7'-2 7/16"	7'-10 3/16"	8'-3 5/8"	8'-6 3/4"	8'-7 1/2"
13'-6"	63'-0 5/8"	4'-3"	5'-5 13/16"	6'-6 5/16"	7'-4 7/16"	8'-0 3/16"	8'-5 5/8"	8'-8 3/4"	8'-9 1/2"

NOTE: VALUES FOR TRACK CENTERS NOT SHOWN MAY BE DETERMINED BY INTERPOLATION.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2151

Oct. 28, 1992 (2)

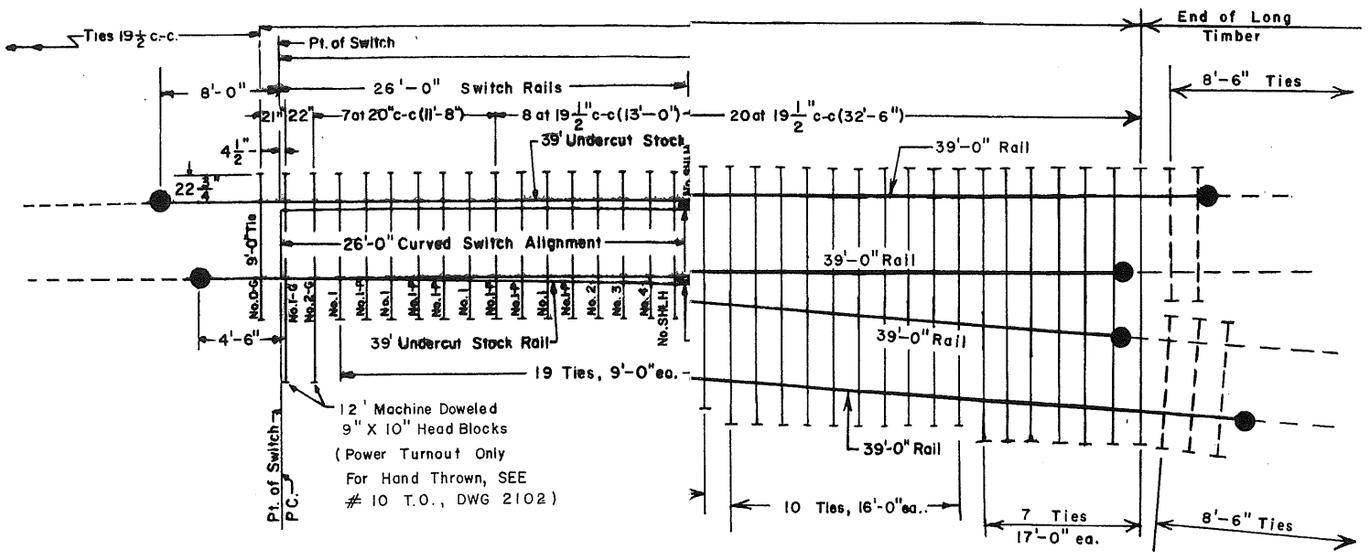
ISSUE DATE ISSUE NO.

OFFSETS FOR NO. 15 TURNOUT

115 OR 132 R.E. RAIL-UNDERCUT

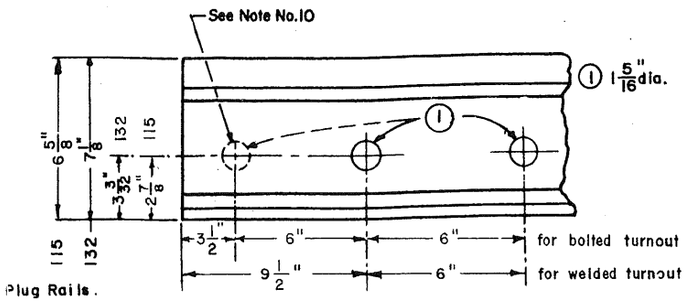
John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER


Ties 19½ c-c.
Pt. of Switch
End of Long Timber
8'-0"
26'-0" Switch Rails
8'-6" Ties
2" 22" 7 at 20"c-c (11'-8") 8 at 19½"c-c (13'-0") 20 at 19½"c-c (32'-6")
39' Undercut Stock
39'-0" Rail
4½"
22¾"
9'-0" Tie
26'-0" Curved Switch Alignment
39'-0" Rail
No.0-G No.1-G No.2-G No.1 No.1-P No.1 No.1-P No.1 No.1-P No.1 No.1-P No.2 No.3 No.4 No.SH.L.H
4'-6"
39' Undercut Stock Rail
39'-0" Rail
19 Ties, 9'-0" ea.
12' Machine Doweled 9" X 10" Head Blocks (Power Turnout Only For Hand Thrown, SEE # 10 T.O., DWG 2102)
Pt. of Switch P.C.
39'-0" Rail
10 Ties, 16'-0" ea.
7 Ties 17'-0" ea.
8'-6" Ties

NOTES

1 – Stock rails and switch points and all rails furnished with the turnout to be fully heat treated.
2 – Switch Points per A.R.E.A. Detail 5100 as shown on plan 2155.
3 – 39' stock rails, to be undercut as per Plan 2155.
4 – For switch detail see Plan 2155.
5 – Gage plates O-G, I-G and 2-G as per Plan 2157.
6 – Switch plates Nos. I and I-P as per Plan 2157.
7 – Turnout plates, No.2 thru No.14 as per Plan 2340
8 – Vertical insulated switch rods and adjustable rocker clips, generally as per Plan 2158.
9 – Heel block, as per Plan 2350.
10 – All rails, including switch rails, to be drilled as shown on this plan, except that first hole is not to be drilled by the manufacturer. Forces, designated by the Authority, are to drill the first hole when necessary.
11 – All tie plates to be resiliently fastened, except, frog tie plates and gua
12 – Rail lengths are computed to allow a $\frac{1}{8}$" gap for temporarily bolting field welded joints and $\frac{3}{16}$" gap for insulated joints. When rails ar in the field, they must be cut to provide gaps recommended by t weld kit manufacturer.



RAIL END DRILLING

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

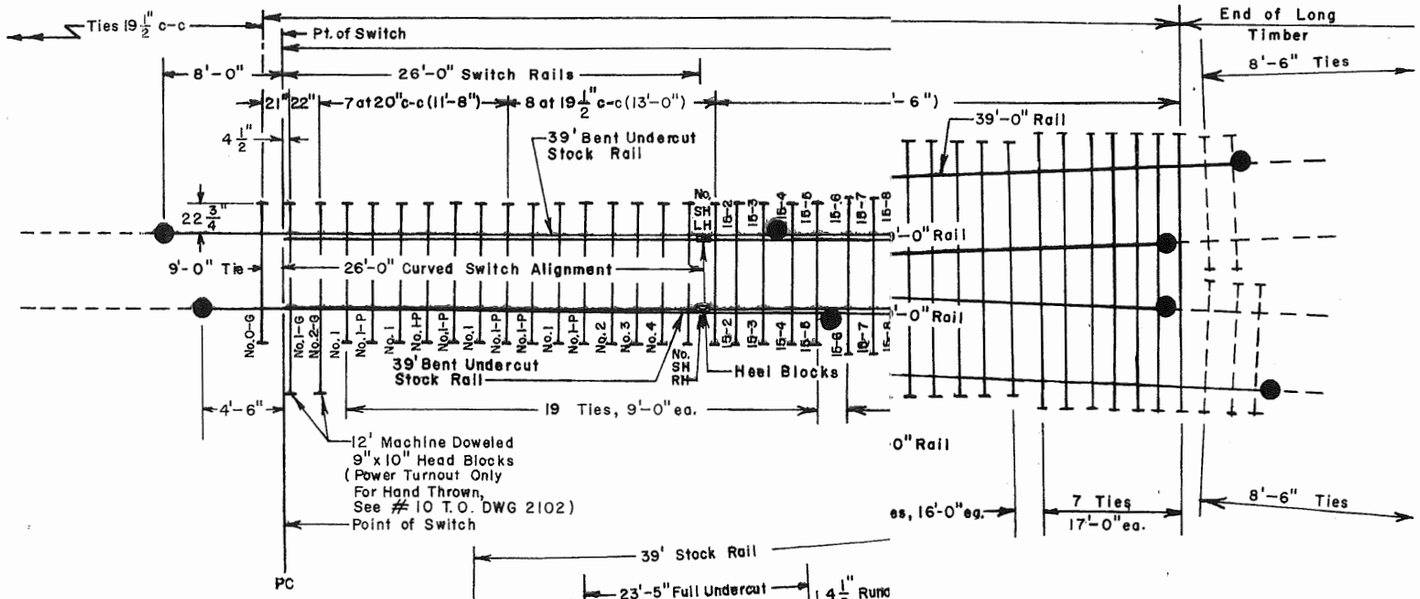
DWG. NO. 2152

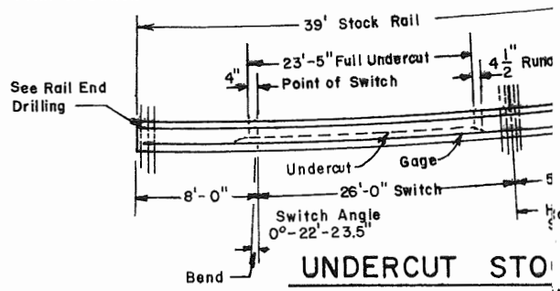
Oct. 28, 1992 (2)
ISSUE DATE ISSUE NO.

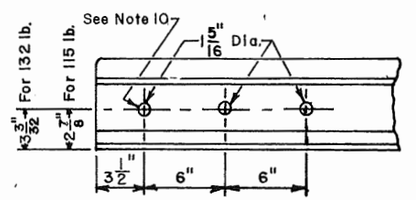
NO. 15 WELDED TURNOUT TIE AND RAIL LAYOUT

John D. Ray
ENGINEERING OFFICER

W. A. Reinhold
CHIEF ENGINEERING OFFICER







RAIL END DRILLING

NOTES

1– Stock rails, switch rails and all rail furnished with the turnout to be fully heat treated.

2– **Switch Points** per A.R.E.A. Detail 5100 as shown on plan 2155.

3– 39' stock rails are to be undercut as shown on this plan.

4– Gage plates 0-G, 1-G and 2-G as per plan 2157.

5– Switch plates Nos. 1 and 1-P as per plan 2157.

6– For turnout plates behind heel, see Plan 2340.

7– Vertical insulated switch rods and adjustable rocker clips generally as per plan 2158.

8– Heel blocks as per Plan 2350.

9– For switch details, see Plan 2155, modified as indicated for an equilateral.

10– All rails, including switch rails, to be drilled as shown on this sheet, except that the first hole is not to be drilled by the manufacturer. Installer to field drill first hole when necessary.

11– See Plan 2150 for bill of materials.

12– All tie plates to be resiliently fastened except frog tie plates and guard rails.

13– Rail lengths are computed to allow a $\frac{1}{8}$" gap for temporarily bolting of the field welded joints and $\frac{3}{16}$" gap for insulated joints. When rails are welded in the field, they must be cut to provide gaps recommended by the weld kit manufacturer.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2153

Oct. 28, 1992 (2)

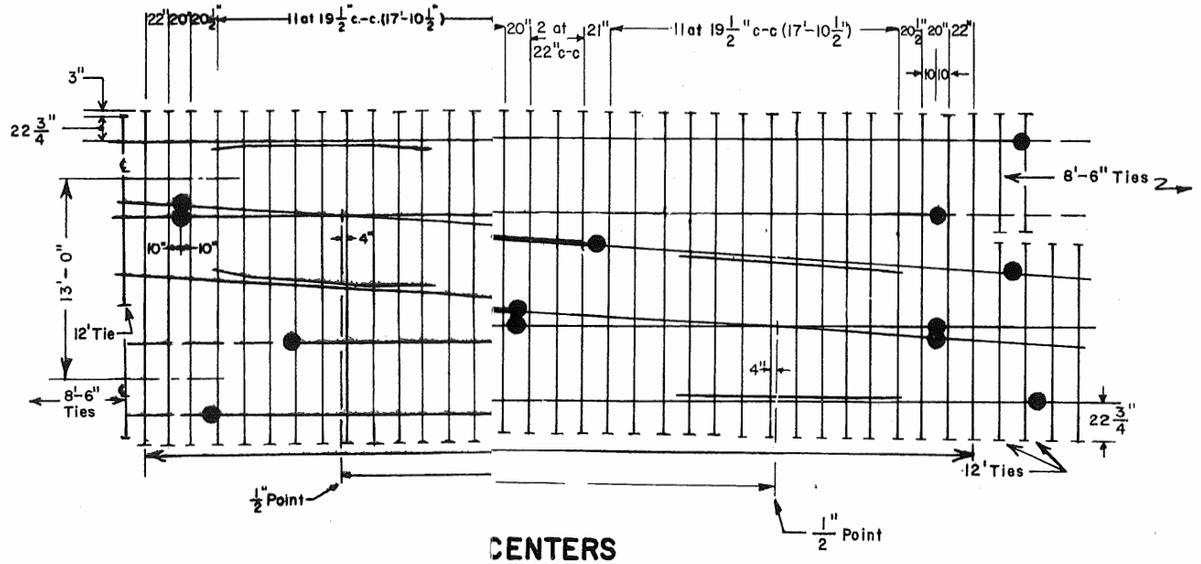
ISSUE DATE ISSUE NO.

NO. 15 EQUILATERAL TURNOUT TIE AND RAIL LAYOUT

John D. Ray

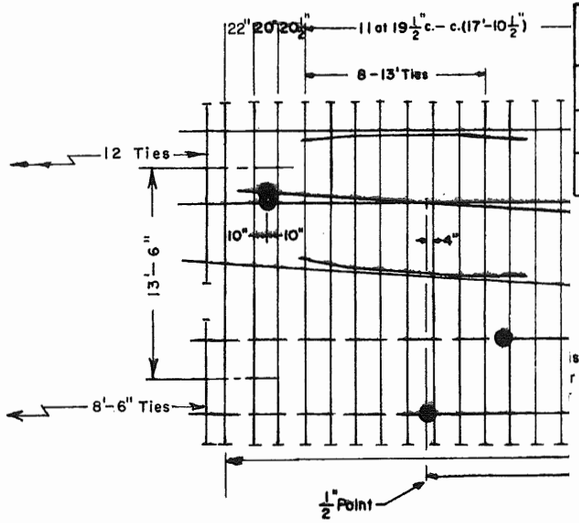
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



CENTERS

SWITCH TIMBER FOR A CROSSOVER



TRACK CENTERS	TIMBER LENGTHS						
	9'-0"	10'-0"	11'-0"	12'-0"	13'-0"	21'-0"	22'-0"
12'-6"	40	32	22	24 ◔	—	43	—
13'-0"	40	32	22	24 ◔	—	—	48
13'-6"	40	32	22	24 ◔		—	53

◔ Includes 4 headblock ties

is for exact
r track centers
schedule and

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

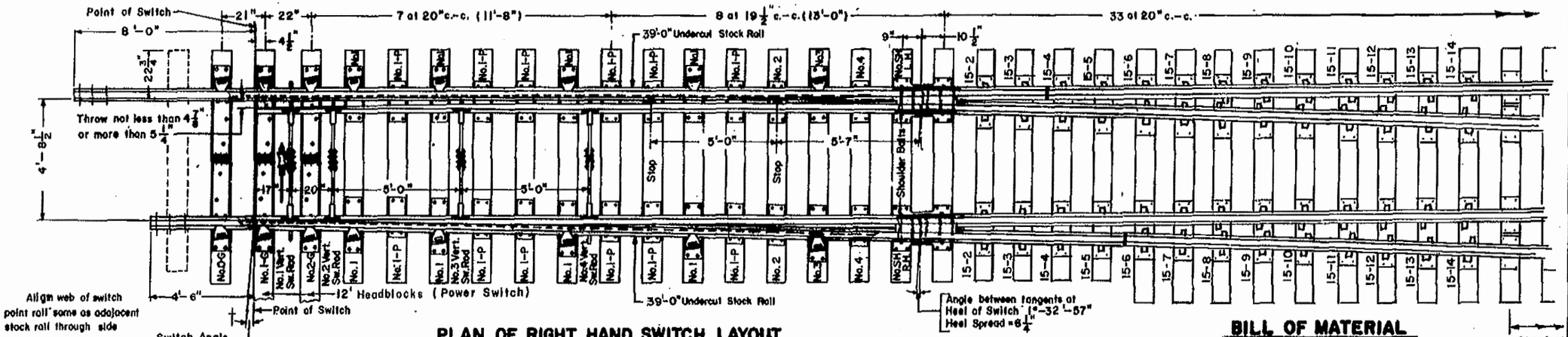
DWG. NO. 2154

Oct. 28, 1992 (2)
ISSUE DATE ISSUE NO.

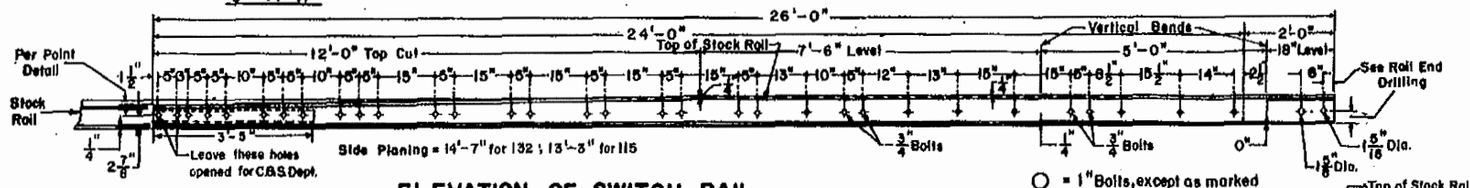
NO. 15 CROSSOVER TIE AND RAIL LAYOUT

John D. Ray
ENGINEERING OFFICER

W. A. McDonald
CHIEF ENGINEERING OFFICER

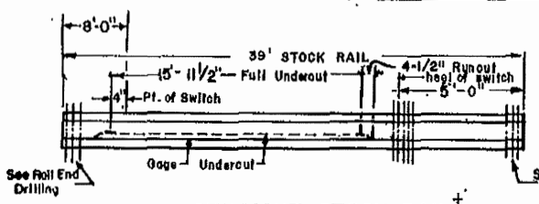


PLAN OF RIGHT HAND SWITCH LAYOUT

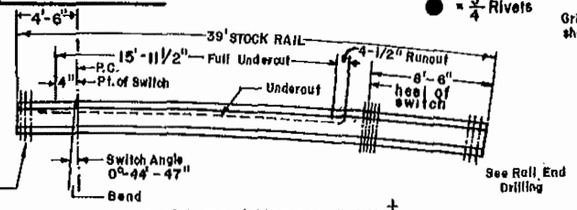


ELEVATION OF SWITCH RAIL

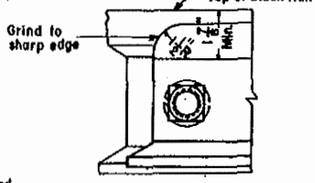
○ = 1" Bolts, except as marked
● = ¾" Rivets



STRAIGHT STOCK RAIL†



CURVED STOCK RAIL†

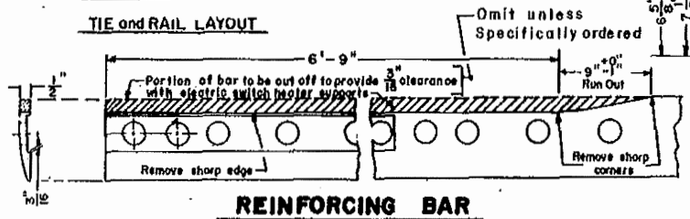


END OF SWITCH RAIL (SIDE VIEW)

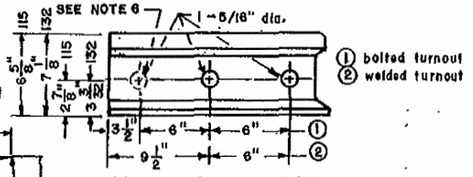
TURNOUT INFORMATION

OFFSETS

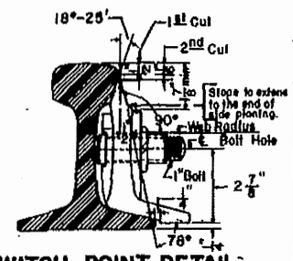
TIE and RAIL LAYOUT


Omit unless Specifically ordered
6'-9"
Portion of bar to be cut off to provide ¾" clearance with electric switch heater supports
9" +0" -1" Run Out
½"
Remove sharp edge
Remove sharp corners

REINFORCING BAR



RAIL END DRILLING



SWITCH POINT DETAIL (A.R.E.A. DESIGN 5100)

BILL OF MATERIAL

Standard Resilient Fastener Plates

✱ 1 - Pair 26'-0" Switch Points, 1-R.H. straight and 1-L.H. curve, complete with reinforcing bars, clips and stops attached.
2 - 39'-0" Undercut Stock Rails.
4 - Insulated Vertical Switch Rods, (with basket. See Plan 2158.
2 - Heel Block Assemblies, complete. See Plan 2350.
3 - Insulated Gage Plates, No.0-G, No.1-G and No.2-G
8 - No.1 Adjustable Brace Slide Plates
2 - No.3 " " " "
12 - No.1-P Shoulder Slide Plates
2 - No.2 " " "
2 - No.4 " " "
2 - No.SH Heel Plates, 1-R.H. and 1-L.H.
} See Plan 2157
16 - Adjustable Rail Braces, Resilient Type, complete, See Plan 2352.
4 - Switch Stops. See Plan 2350.
8 - Adjustable Rocker Clips for Vertical Switch Rods. See Plan 2158.
28 - Turnout Pocket Plates with Welded Pressed Steel Shoulders for Resilient Fasteners Plan 2540

NOTES

1 - This plan is for use with A.R.E.A recommended standards for 132 or 115 RE Rail.
2 - Stock rails, switch rails and all supplied rail to be fully heat treated.
3 - All bolts shall be dipped immediately before applying (so that all threads are thoroughly coated) in grease.
✱ 4 - When ordering a Left Hand Switch, these items shall be opposite hand.
† 5 - For stock rails, switch angles, and offsets for an equilateral — see Plan 2155.
6 - All rails, to be drilled as shown on this plan, except, the first hole is not to be drilled by manufacturer. Installer to drill first hole.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2155

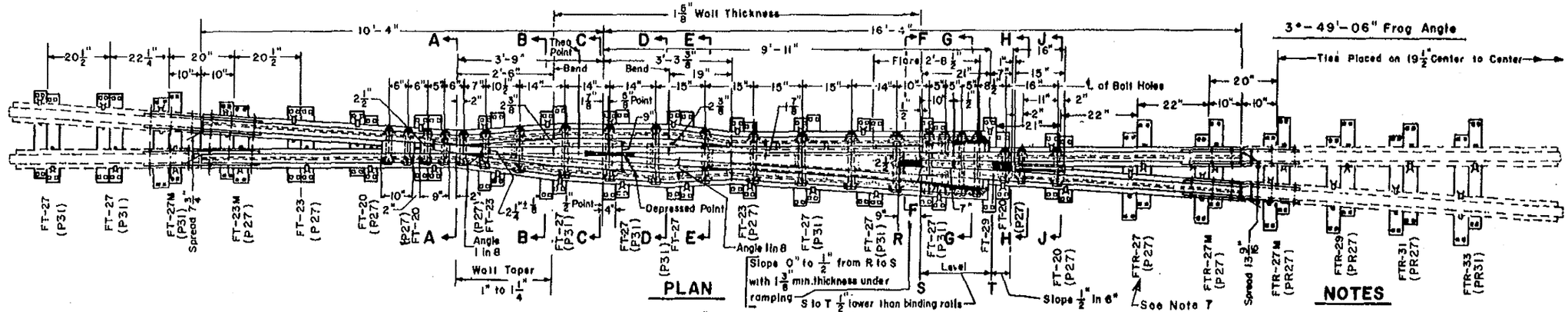
Oct. 28, 1992 (2)
ISSUE DATE ISSUE NO.

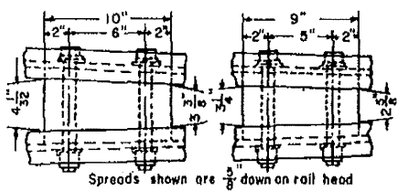
26'-0" CURVED SPLIT SWITCH

115 OR 132 R.E. RAIL - INSULATED & UNDERCUT

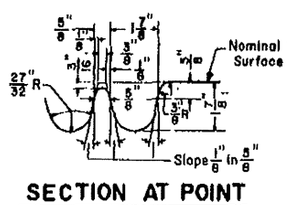
John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER

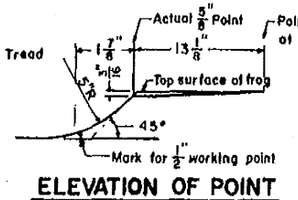




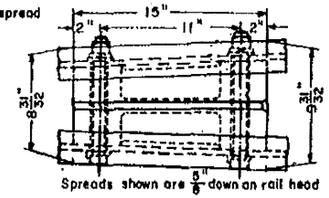
TOE FILLER BLOCKS



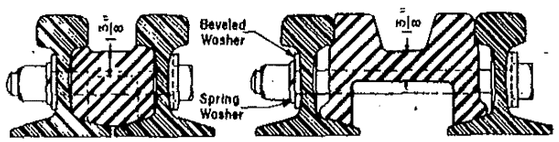
SECTION AT POINT



ELEVATION OF POINT

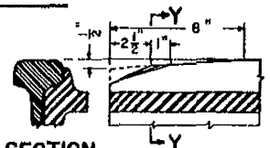


HEEL FILLER BLOCK



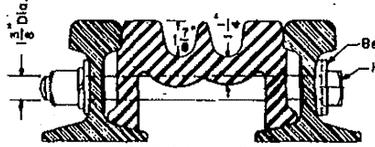
SECTION A-A

SECTION B-B

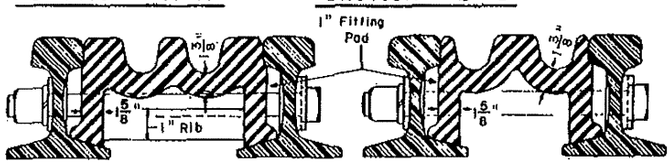


SECTION Y-Y

SECTION AT TOE AND HEEL END OF MANGANESE

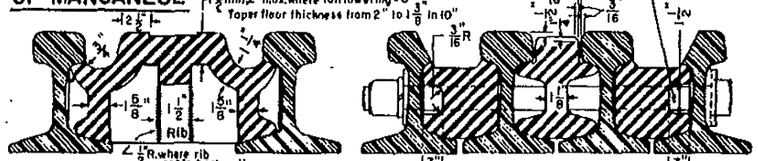


SECTION C-C



SECTION D-D

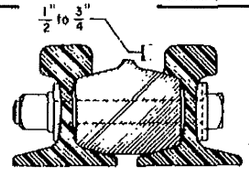
SECTION E-E



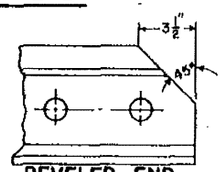
SECTION F-F

SECTION G-G

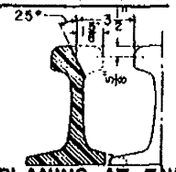
SECTION H-H



SECTION J-J



BEVELED END OF WING RAIL



PLANING AT END OF WING RAIL

FROG TIE PLATES REQUIRED

7-FT 20	2-FTR 27
6-FT 23	4-FTR 27 Mod.
2-FT 23 Mod.	2-FTR 29
16-FT 27	2-FTR 31
2-FT 27 Mod.	2-FTR 33
1-FT 29	

OR

20-P27 SAS (Self Aligning Shoulder)
18-P31 SAS
6-PR27 SAS
2-PR31 SAS

See Note 7

1 – This plan is for use with A.R.E.A. recommended standards for 115 & 132 lb. RE Rail, Heavy Wall Section.

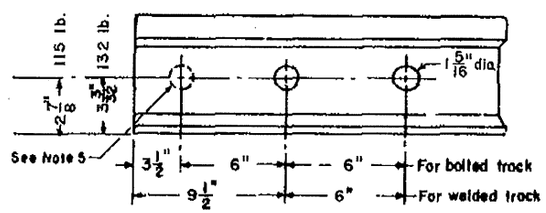
2 – Workmanship and materials, including beveling shall be per current "A.R.E.A. Specifications".

3 – Groove for bond wires shall extend from end of filler block at least to center line of second bolt

4 – All bolts used in construction of frog and switch material shall be dipped immediately before applying (so that all threads are thoroughly coated) in grease manufactured for this purpose.

5 – When frog is to be used in bolted track, the first bolt hole to be drilled in the field by MBTA Forces.

6 – Casting to be explosion hardened, with toe and heel arms to be fully heated rails.



RAIL END DRILLINGS

7. – Both FT and SAS Plates (in parenthesis) shown. Furnish SAS Plates unless otherwise specified.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

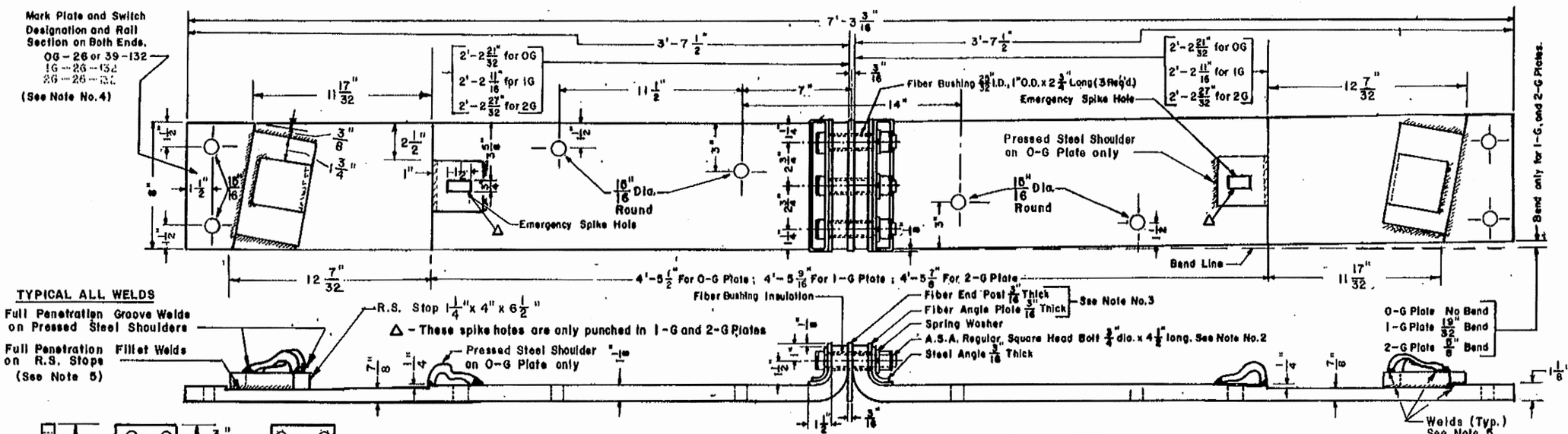
DWG. NO. 2156

Jan. 5, 1996 (3)
ISSUE DATE ISSUE NO.

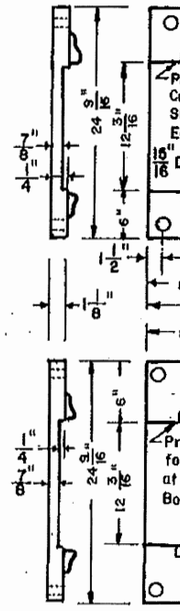
No. 15 RAILBOUND MANGANESE STEEL FROG

FOR 115 LB OR 132 LB. R.E. RAIL

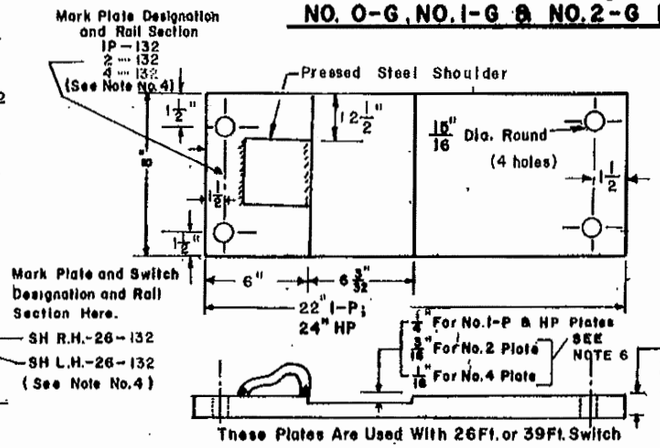
John D. Ray
SECTION CHIEF


Mark Plate and Switch Designation and Rail Section on Both Ends.
OG – 26 or 39 – 132
1G – 26 – 132
2G – 26 – 132
(See Note No. 4)
7'-3 3/16"
3'-7 1/2"
3'-7 1/2"
2'-2 21/32" for OG
2'-2 11/16" for 1G
2'-2 27/32" for 2G
11 17/32"
11 1/2"
7"
14"
3/16"
Fiber Bushing 29/32" I.D., 1" O.D. x 2 3/4" Long (3 Req'd.)
Emergency Spike Hole
Pressed Steel Shoulder on O-G Plate only
15/16" Dia. Round
Emergency Spike Hole
12 7/32"
Bend only for 1-G and 2-G Plates
Bend Line
11 17/32"
12 7/32"
4'-5 1/2" For O-G Plate; 4'-5 9/16" For 1-G Plate; 4'-5 7/8" For 2-G Plate
TYPICAL ALL WELDS
Full Penetration Groove Welds on Pressed Steel Shoulders
Full Penetration Fillet Welds on R.S. Stops (See Note 5)
R.S. Stop 1 1/4" x 4" x 6 1/2"
△ – These spike holes are only punched in 1-G and 2-G Plates
Pressed Steel Shoulder on O-G Plate only
Fiber Bushing Insulation
Fiber End Post 5/16" Thick
Fiber Angle Plate 3/16" Thick
See Note No. 3
Spring Washer
A.S.A. Regular, Square Head Bolt 3/4" dia. x 4 1/2" long. See Note No. 2
Steel Angle 3/16" Thick
O-G Plate No Bend
1-G Plate 19/32" Bend
2-G Plate 5/8" Bend
Welds (Typ.) See Note 5

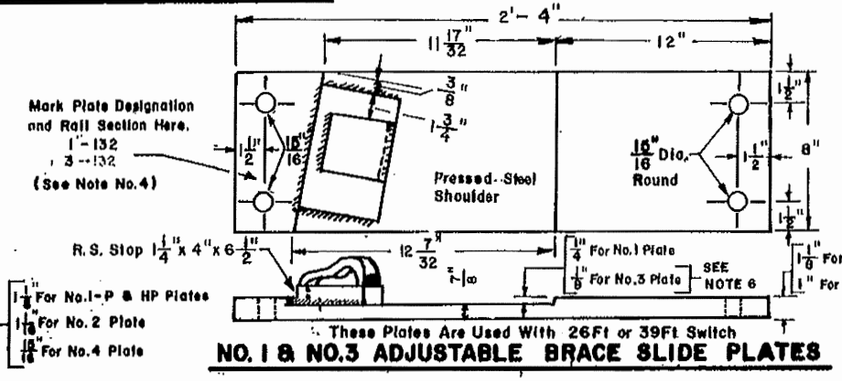
NO. O-G, NO. 1-G & NO. 2-G INSULATED GAGE PLATES


Provide Holes for Cut Spike at Shoulder Bolt End.
15/16" Dia. (Typ) Right Hand
Pressed Steel Shoulders
SH R.H.-26-132
SH L.H.-26-132
(See Note No. 4)
Provide Holes for Cut Spike at Shoulder Bolt end.
Left Hand

NO. SH (R.H. & L.H.) HEEL PLATES


Mark Plate Designation and Rail Section
1P – 132
2 – 132
4 – 132
(See Note No. 4)
Pressed Steel Shoulder
15/16" Dia. Round (4 holes)
Mark Plate and Switch Designation and Rail Section Here.
22" 1-P, 24" HP
For No. 1-P & HP Plates
For No. 2 Plate
For No. 4 Plate
SEE NOTE 6
These Plates Are Used With 26Ft. or 39Ft. Switch

NO. 1-P, NO. 2, NO. 4 & NO. HP SHOULDER SLIDE PLATES


Mark Plate Designation and Rail Section Here.
1 – 132
3 – 132
(See Note No. 4)
Pressed Steel Shoulder
15/16" Dia. Round
R.S. Stop 1 1/4" x 4" x 6 1/2"
For No. 1 Plate
For No. 3 Plate
SEE NOTE 6
These Plates Are Used With 26Ft or 39Ft. Switch

NO. 1 & NO. 3 ADJUSTABLE BRACE SLIDE PLATES

NOTES:

1 – Switch Plates shall conform to current A.R.E.A. Specifications for Low-Carbon Steel Tie Plates, with copper.

2 – All gage plate bolts shall have A.S.A. Regular square heads and A.S.A. Heavy square nuts. All bolts shall be carbon-steel with medium-carbon steel nuts and conform to current A.R.E.A "Specifications for Heat-Treated Carbon-Steel Track Bolts and Carbon Steel Nuts."

3 – All fiber parts shall conform to current A.A.R. Signal Section Manual, Part 58, Specification No. 13 for "Hard Fiber" and A.A.R. Signal Section Manual, Part No. 178 covering "Requisites for Fabricated Fiber Parts for Track Insulation."

4 – Plates shall be marked with deeply cut characters, not less than 1/2" high, in the position as indicated on this plan.

5 – Welds shall be made so that they do not interfere with the installation of resilient fasteners and rail braces.

6 – Modify contour of pressed steel shoulder or, shim plates 2, 3, & 4 to maintain uniform toe pressure from the resilient fasteners.

7 – For adjustable brace used with these plates, see Dwg. 2352.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2157

Jan. 5, 1996 (3)

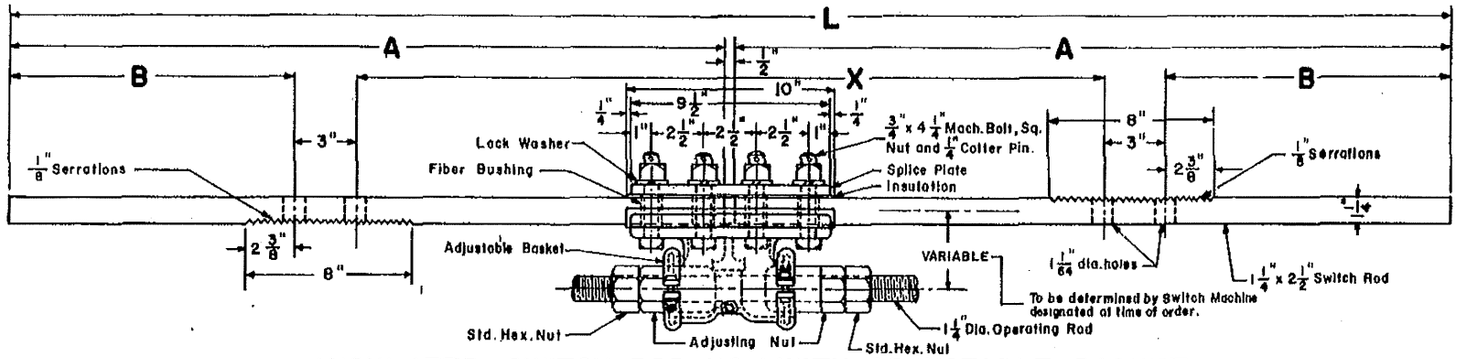
ISSUE DATE ISSUE NO.

SWITCH PLATES and GAGE PLATES

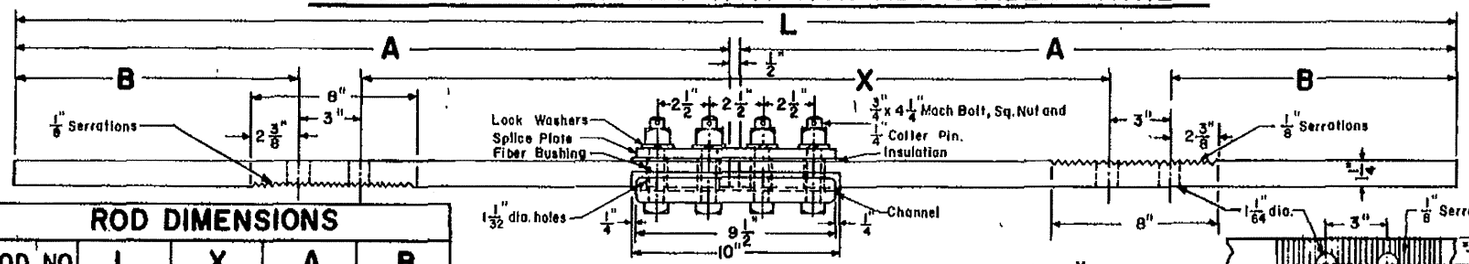
FOR 26'-0" SWITCH-132 LB RAIL

John D. Ray

SECTION CHIEF



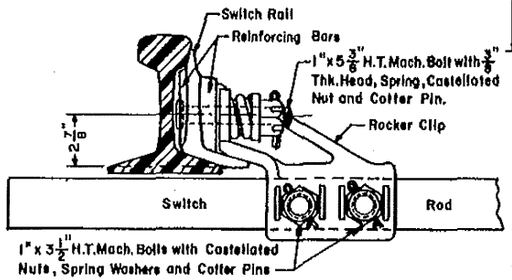
INSULATED SWITCH ROD NO. 1 WITH ADJUSTABLE BASKET



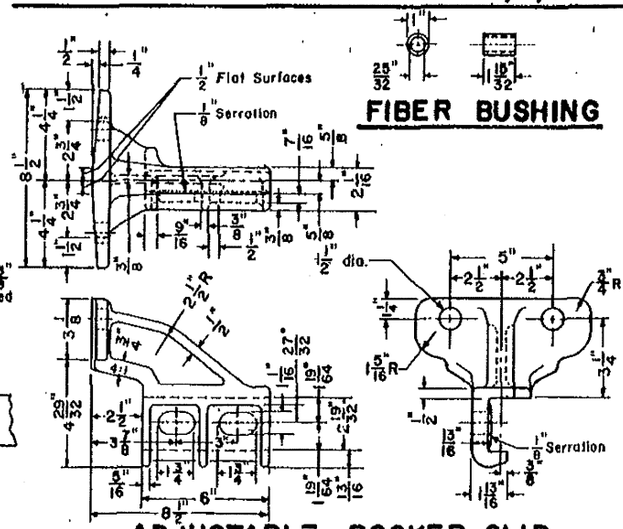
INSULATED SWITCH RODS NOS. 2, 3, 4 & 5*

ROD DIMENSIONS

ROD NO.	L	X	A	B
1	5'-10"	2'-11 7/8"	2'-10 3/4"	14 1/16"
2	4'-4"	3'-0 11/32"	2'-1 3/4"	4 53/64"
3	4'-4"	3'-1 1/8"	2'-1 3/4"	4 7/16"
4	5'-10"	3'-2 7/16"	2'-10 3/4"	12 25/32"
5*	5'-10"	3'-2 7/16"	2'-10 3/4"	12 25/32"

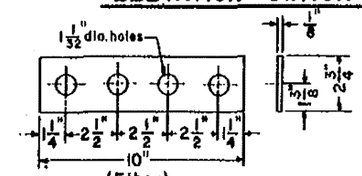

Switch Rail
Reinforcing Bars
1" x 5 3/8" H.T. Mach. Bolt with 3/8" Thk. Head, Spring, Castellated Nut and Cotter Pin.
Rocker Clip
2 7/8"
Switch
Rod
1" x 3 1/2" H.T. Mach. Bolts with Castellated Nuts, Spring Washers and Cotter Pins

ASSEMBLED ROCKER CLIP

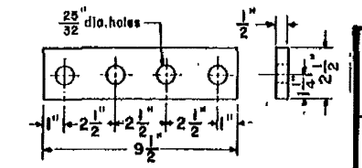


ADJUSTABLE ROCKER CLIP

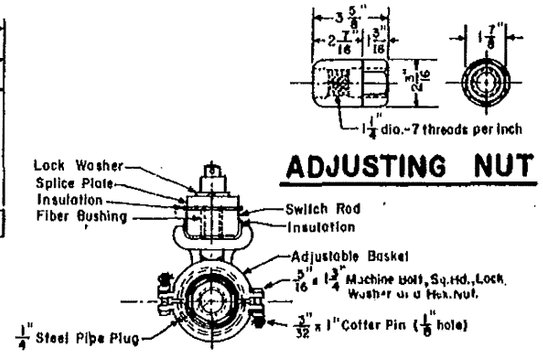
FIBER BUSHING



INSULATION PLATE FOR SPLICE PLATE

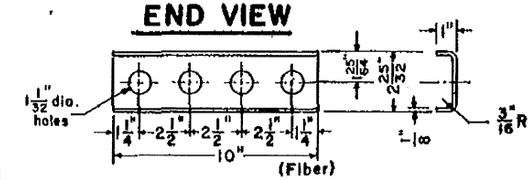


SPLICE PLATE

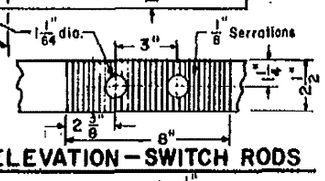


ADJUSTING NUT

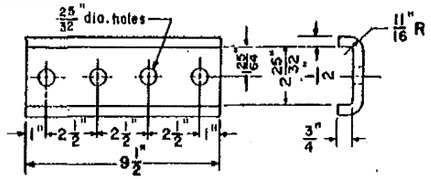
END VIEW



INSULATION FOR CHANNEL



ELEVATION – SWITCH RODS



CHANNEL – STEEL

NOTES

1 – All switch rods shall conform to current A.R.E.A. Specifications.

2 – All fiber parts shall conform to current A.A.R. Signal Section Manual, Part 58, Specifications 13 – Hard Fiber.

3 – Each switch rod shall be marked with deeply cut characters, not less than 1/2" high, with rod designation and rail section.

*4 – No. 5 Rod is not required for turnouts with solid heel blocks but is required with floating heel blocks.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2158

Oct. 28, 1992 (2)

ISSUE DATE ISSUE NO.

VERTICAL SWITCH RODS AND ADJUSTABLE ROCKER CLIPS

FOR 26'-0" SWITCH – 115 LB. OR 132 LB. RE RAIL

John D. Ray

ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER

NO. 15 TURNOUT WITH FLOATING HEEL BLOCKS - BILL OF MATERIAL

QUANTITY	DESCRIPTION	REFERENCE PLAN NO.
1*	PAIR 38'-0" CURVED SWITCH POINTS COMPLETE WITH REINFORCING BARS, CLIPS AND STOPS ATTACHED.	2165
2	FLOATING HEEL BLOCKS	2350
2	60'-0" UNDERCUT STOCK RAILS	2360
3	INSULATED GAGE PLATES (NO. 0G, 1G, & 2G)	2157
10	NO. 1 ADJUSTABLE BRACE SLIDE PLATES	2157
16	NO. 1P SHOULDER SLIDES PLATES	2157
4	NO. HP HEEL PLATES	2157
4	SWITCH RAIL STOPS	2350
10	ADJUSTABLE ROCKER CLIPS FOR VERTICAL SWITCH RODS	2158
5	INSULATED VERTICAL SWITCH RODS (NO. 1, 2, 3, 4 & 5))	2158
20*	TURNOUT PLATES FOR USE BEHIND HEEL OF SWITCH (NO. 15-2 R/L TO 15-8 R/L & 15-9 TO 15-15)x2	2343
16	RESILIENTLY FASTENED ADJUSTABLE RAIL BRACE	2352
1	NO. 15 RAILBOUND MANGANESE STEEL FROG, COMPLETE	2156
20	NO. P27 SELF ALIGNING SHOULDER TIE PLATE	2328
18	NO. P31 SELF ALIGNING SHOULDER TIE PLATE	2328
6	NO. PR27 SELF ALIGNING SHOULDER TIE PLATE	2328
2	NO. PR31 SELF ALIGNING SHOULDER TIE PLATE	2328
2	13'-3" MANGANESE STEEL ONE PIECE GUARD RAILS	2302
2	19'-6" BONDED INSULATED JOINT PLUG RAIL	1340
2	78'-0" LENGTHS OF FULLY HEAT TREATED RAIL	-
3	39'-0" LENGTHS OF FULLY HEAT TREATED RAIL	-
1 EA.+	VARIOUS LENGTHS OF FULLY HEAT TREATED RAIL AS FOLLOWS: 62'-10½", 22'-9½", 20'-8"	-
1276	¾" SCREW SPIKES	1218
62**	⅞" x 6" TRACK DRIVE SPIKES	1217
528	RESILIENT FASTENER SPRING CLIPS - TYPE "E"	-
8	RESILIENT FASTENER SPRING CLIPS - TYPE MODIFIED "E"	-
190	RESILIENT FASTENER TIE PLATES FOR SCREW SPIKES	1225
14	1:80 CANT TRANSITION TIE PLATES	2348
1	FLAT PLATE TIE PLATE	2348
19	STANDARD JOINT BAR ASSEMBLIES	1322
76	STANDARD TRACK BOLTS WITH NUTS & WASHERS	1332

* THESE ITEMS SHALL BE SUPPLIED FOR R.H., L.H. OR EQUILATERAL TURNOUT, AS REQUIRED
+ FOR EQUILATERAL TURNOUTS, CLOSURE RAILS HAVE SLIGHTLY DIFFERENT LENGTHS
** SUPPLIED BY THE INSTALLER

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

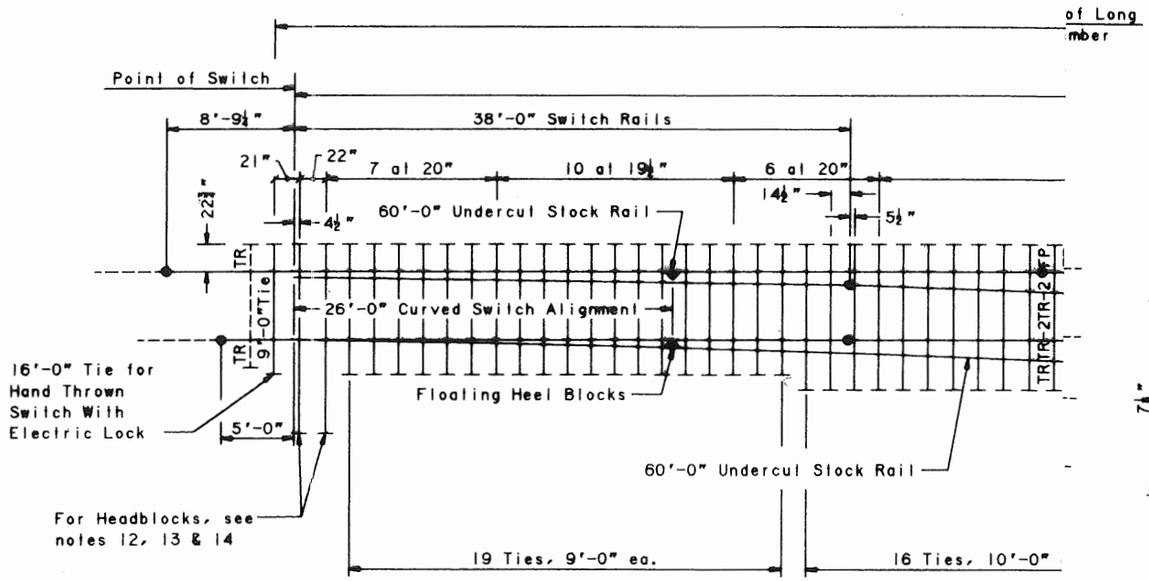
RAILROAD OPERATIONS

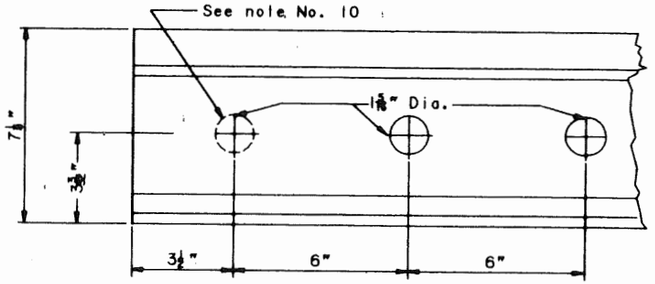
DWG. NO. 2160

JAN. 5, 1996 (2)
ISSUE DATE ISSUE NO.

NO. 15 FLOATING HEEL BLOCK TURNOUT
BILL OF MATERIAL

John D. Bay
SECTION CHIEF





RAIL END DRILLING

LONG TIMBERS REQUIRED

Quantity	Length
20	9'-0"
16	10'-0"
11	11'-0"
10	12'-0"
9	13'-0"
8	14'-0"
9	15'-0"
10	16'-0"
8	17'-0"
101	Total

-Headblocks not shown in table, see notes 12, 13 & 14.

FROG TIE PLATES

20 - P27 SAS (self-aligning shoulder)
18 - P31 SAS
6 - PR27 SAS
2 - PR31 SAS

NOTES

1-Stock rails, switch points and all rails furni heat treated.
2-Switch points per A.R.E.A. Detail 5100 as show
3-60' stock rails, to be undercut as per Plan 23
4-For switch details see Plan 2165.
5-Gage plate No. 1 - G as per Plan 2157.
6-Switch plates Nos. 0, 1, 1A, HP and IP as per
7-Turnout plates, No. 2 thru No. 15, as per Plan
8-Vertical insulated switch rods and adjustable as per Plan 2158.
9-Floating Heel block as per Plan 2350.
10-All rails, including switch rails, to be drill this plan, except that first hole is not to be manufacturer. Installer to field drill first h
11-All tie plates to be resiliently fastened exce
12-Two 9"x10"x13' Headblocks needed with switch s less, 16' long with stands over 3'
13-Three 9"x10"x16' Headblocks needed for hand th electric lock.
14-Two 9"x10"x12' Headblocks needed for power ope
15-See Plan 2160 for Bill of Material
16-Rail lengths are computed to allow a ⅛" gap fo bolting the field welded joints and ¼" gap for When rails are welded in the field, they must recommended by the weld kit manufacturer.
17-Transition Plates (TR) 1:80 Cant, and Flat Pla

LEGEND

- Indicates rails furnished by the manufacturer.
- Indicates rails furnished by the Installer.
- Indicates "floating" heel blocks.
- Indicates insulated joints with 3/16" opening.
- Indicates joints to be field welded.
- Indicates Bonded Insulated Joint Plug Rail

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

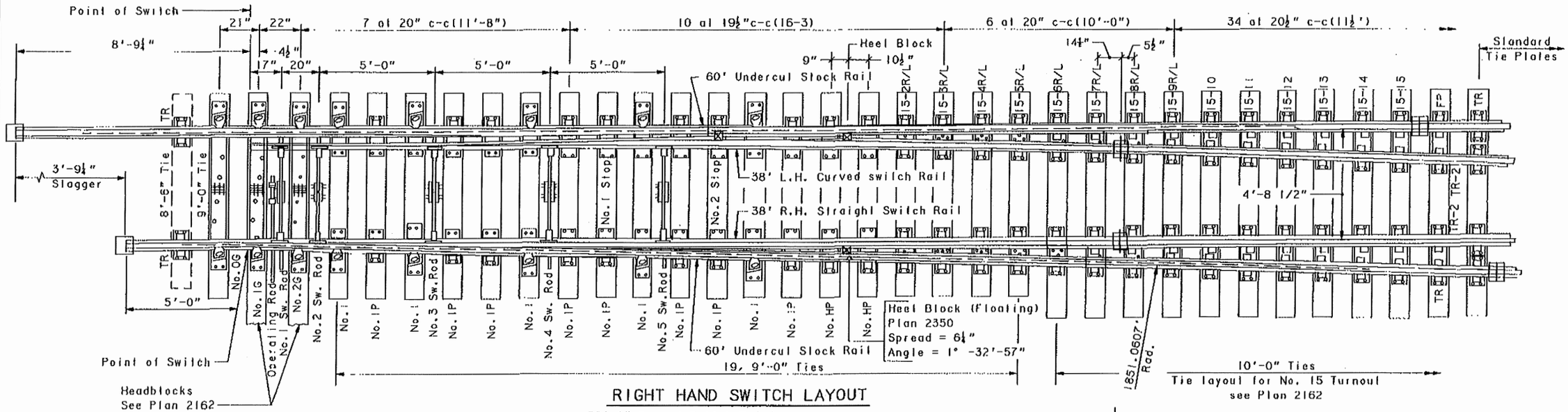
RAILROAD OPERATIONS

DWG. NO. 2162

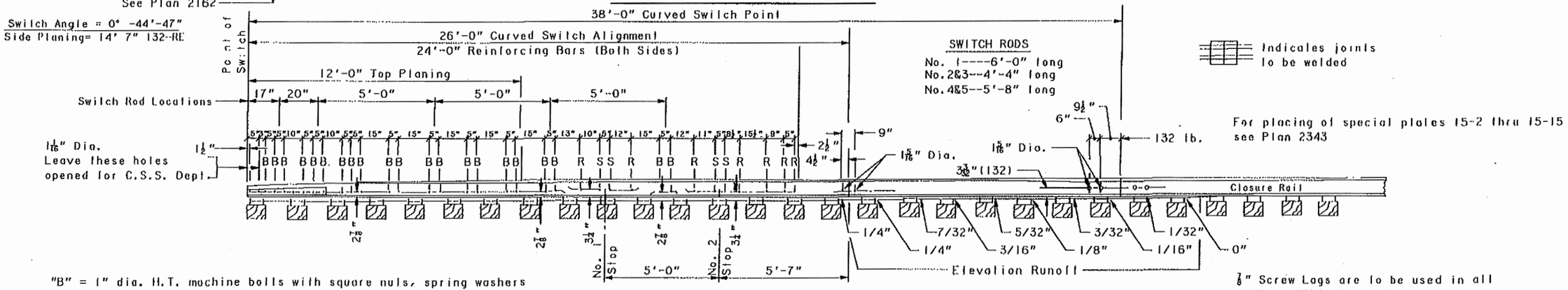
JAN. 5, 1996 (2)
ISSUE DATE ISSUE NO.

NO. 15 TURNOUT WITH FLOATING HEEL BLOCKS - TIE & RAIL LAYOUT

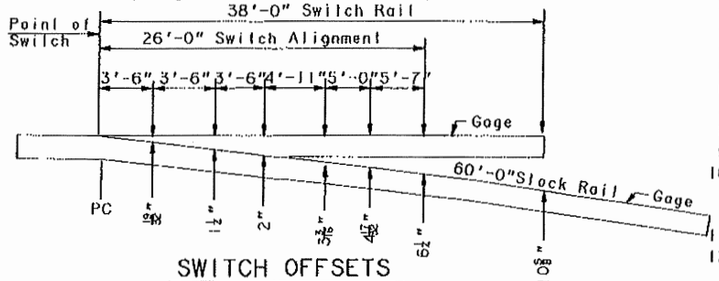
John D. Kenny
SECTION CHIEF



RIGHT HAND SWITCH LAYOUT



"B" = 1" dia. H.T. machine bolts with square nuts, spring washers and ¼" cotter pins. Hex nuts at rocker clips
"R" = ¾"dia. rivets.
"S" = ¾" dia. machine bolts for slops with square nuts, spring washers and ⅝" cotter pins.



SWITCH OFFSETS

ELEVATION OF SWITCH RAIL

NOTES

1. - This plan for use with A.R.E.A. recommended standards for 132 R.E..
2. - Workmanship and materials shall be as per current A.R.E.A. Specifications.
3. - Gage Plates OG, 1G and 2G as shown on Plan 2157.
4. - Switch Plates Nos. 1, 1P and HP shown on Plan 2157.
5. - Turnout Plates No. 2 thru No. 15 as shown on Plans 2343.
6. - Stock Rails to be undercut as per Plan 2360.
7. - Switch Rails to be undercut per A.R.E.A. Design 5100.
8. - All rails to be Fully Heat Treated.
9. - Vertical insulated switch rods and adjustable rocker clips as per Plan 2158.
10. - All rails, including switch rails, to be drilled per Plan 2162 for 132 R.E. rail, with the first hole not to be drilled by manufacturer. Installer to field drill first hole when necessary.
11. - See Plan 2160 for Bill of Material.
12. - All bolts shall be dipped in a non-oxidizing grease immediately before applying so that all threads are thoroughly coated.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2165

Jan 5, 1996 ISSUE DATE

(2) ISSUE NO.

26' CURVED SPLIT SWITCH WITH FLOATING HEEL BLOCKS

John D. Ray
SECTION CHIEF

BILL OF MATERIAL FOR A NO. 20 TURNOUT

Quantity	Description	Reference Plan No.
* 1	Pair of 39'-0" Switch Points, complete with reinforcing bars, clips and stops attached	2205
2	Heel Block Assemblies, complete	2350
* 2	39'-0" Undercut Stock Rails	2205
3	Insulated Gage Plates (No's. 0-G, 1-G & 2-G)	2207
14	No. 1 Adjustable Brace Slide Plates	"
2	No. 3 Adjustable Brace Slide Plates	"
22	No. 1-P Shoulder Slide Plates	"
2	No. 2 Shoulder Slide Plates	"
2	No. 4 Shoulder Slide Plates	"
2	No. SH Heel Plates, 1-RH and 1-LH	"
5	Switch Rail Stops	2350
10	Adjustable Rocker Clips for Vertical Switch Rods	2208
5	Insulated Vertical Switch Rods (No. 1, 2, 3, 4 & 5)	2208
40	Turnout Plates for use behind heel of switch (No. 20-2 to 20-21 x 2)	2340
22	Resiliently Fastened Adjustable Rail Brace	2352
1	No. 20 Railbound Manganese Steel Frog, Complete	2206
2	FT20 Hook Twin Tie Plates	2326
14	FT23 " " " "	"
22	FT27 " " " "	"
4	FT29 " " " "	"
—	FT33 " " " "	"
—	FT23 Modified Hook Twin Tie Plates	"
4	FT27 " " " " "	"
—	FT29 " " " " "	"
—	FT33 " " " " "	"
2	FTR27 Hook Twin Tie Plates	"
—	FTR29 " " " "	"
2	FTR31 " " " "	"
6	FTR33 " " " "	"
—	FTR27 Modified Hook Twin Tie Plates	"
4	FTR29 " " " " "	"
—	FTR31 " " " " "	"

* These items shall be supplied for R.H., L.H. or Equilateral Turnout as required.

Quantity	Description	Reference Plan No.
—	FTR33 Modified Hook Twin Tie Plates	2326
2	13'-3" Manganese Steel One Piece Guard Rails	2302
—	Bonded Insulated Joint Assembly	—
2	39'-0" Bonded Insulated Joint Plug Rail	1340
12	39'-0" Lengths of Fully Heat Treated Rail	—
1ea. †	Various Lengths of Fully Heat Treated Rail as follows: 34'-0", 29'-6", 24'-5", 24'-5 3/16"	—
1966	7" Lock Spikes	1218
140	5/8" x 6" AREA Spikes**	1210
967	Resilient Fastener Spring Clips - Type "E"	—
16	Resilient Fastener Spring Clips - Type Modified "E"	—
396	Standard Resilient Fastener Tie Plates	1224
2	Pairs of Modified Joint Bar Assemblies (Head & Toe of Gage Side Bars Removed to Allow Switch Movement at Joint near Heel of Switch - No. 20 only)	2202
1	Mechanism for Bell Crank Helper, Complete	2209
22	Standard Joint Bar Assemblies	1322 or 1320
88	Standard Track Bolts with Nuts and Washers	1332

** Cut Spikes are to be furnished by the Installer.
Weld Kits (24) to be furnished by the Installer.

† For Equilateral Turnout, closure rails have slightly different lengths. See Equilateral Drawing (2203).

Notes:

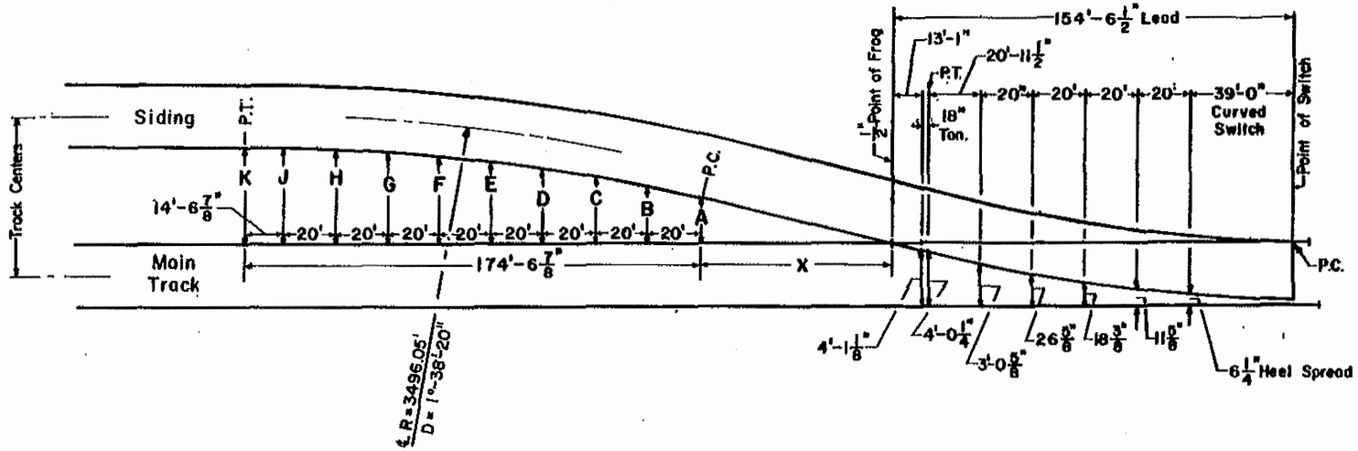
1. Turnouts supplied shall be either 115 or 132 LB. RE as specified in the order.
2. Turnouts shall be resiliently fastened throughout, except Frog Tie Plates, Guard Rails and locations where Spring Clips cannot be physicaly installed such as on turnout plates near heel.
3. Fabricator shall supply all material required for the complete installation of the turnout except switch timber unless otherwise specified in the order.
4. For Switch Timber Schedule, see Plan 2202.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY | RAILROAD OPERATIONS | DWG. NO. 2200 | Apr. 29, 1996 (3) ISSUE DATE / ISSUE NO.

NO. 20 TURNOUT BILL OF MATERIAL

John D. Ray — ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



TURNOUT DATA FOR BOLTED TRACK

FROG – R.B.M.

Number	20
Angle	2°-51'-51"
Toe Length	13'-1"
Heel Length	21'-1"
Total Length	34'-2"

SWITCH RAILS

Length	39'-0"
Type	Curved
Switch Angle For Undercut Points	0°-25'-32"
Heel Block Angle	1°-06'-17"
Point of Curve (P.C.)	At Switch Point

LEAD

Point of Switch to ½" Point of Frog	154'-6½"
℄ Radius	3289.332'
Degree of Curve	1°-44'-31"
Length of Curved Closure Rail	102'-6½"
Length of Straight Closure Rail	102'-5½"

OFFSETS BEHIND THE HEEL OF FROG

TRACK CENTERS	X	A	B	C	D	E	F	G	H	J	K
12'-2"	61'-0⅛"	3'-1⅛"	4'-0½"	4'-10⅜"	5'-7"	6'-2⅛"	6'-8"	7'-0⅜"	7'-3½"	7'-5⅝"	7'-5½"
12'-4"	64'-4⅛"	3'-3⅛"	4'-2½"	5'-0⅜"	5'-9"	6'-4⅛"	6'-10"	7'-2⅜"	7'-5½"	7'-7⅞"	7'-7½"
12'-6"	67'-8⅛"	3'-5⅛"	4'-4½"	5'-2⅜"	5'-11"	6'-6⅛"	7'-0"	7'-4⅜"	7'-7½"	7'-9⅛"	7'-9½"
12'-8"	71'-0¼"	3'-7⅛"	4'-6½"	5'-4⅜"	6'-1"	6'-8⅛"	7'-2"	7'-6⅜"	7'-9½"	7'-11⅛"	7'-11½"
12'-10"	74'-4"	3'-9⅛"	4'-8½"	5'-6⅜"	6'-3"	6'-10⅛"	7'-4"	7'-8⅜"	7'-11½"	8'-1⅛"	8'-1½"
13'-0"	77'-8"	3'-11⅛"	4'-10½"	5'-8⅜"	6'-5"	7'-0⅛"	7'-6"	7'-10⅜"	8'-1½"	8'-3⅛"	8'-3½"
13'-2"	80'-11⅞"	4'-1⅛"	5'-0½"	5'-10⅜"	6'-7"	7'-2⅛"	7'-8"	8'-0⅜"	8'-3½"	8'-5⅛"	8'-5½"
13'-4"	84'-3⅞"	4'-3⅛"	5'-2½"	6'-0⅜"	6'-9"	7'-4⅛"	7'-10"	8'-2⅜"	8'-5½"	8'-7⅛"	8'-7½"
13'-6"	87'-8"	4'-5⅛"	5'-4½"	6'-2⅜"	6'-11"	7'-6⅛"	8'-0"	8'-4⅜"	8'-7½"	8'-9⅛"	8'-9½"

Values for track centers not shown may be determined by interpolation.

NOTES

1- The lines of the diagram indicate gage lines.

2- For details see the following plans:—
Switch- 2205 or 2215
Frog-R.B.M. 2206

3- For welded turnouts see Plan 2202 or 2212 for offsets between the point of switch and the toe of frog.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2201

Oct. 28, 1992 (2)
ISSUE DATE ISSUE NO.

OFFSETS FOR NO. 20 TURNOUT

115 OR 132 R.E. RAIL - UNDERCUT

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER